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E. L. Bousfield
and Diana R. Laubitz

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Station Lists and New Distributional Records of Littoral Marine Invertebrates of the Canadian Atlantic and New England Regions

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Résumé

On a préparé des cartes locales et compilé les données accumulées dans les stations de recherche. Celle-ci s'est effectuée sur place et porte sur la répartition et l'écologie des invertébrés marins côtiers, principalement des mollusques et des crustacés des régions suivantes: l'estuaire du St-Laurent et la côte gaspésienne, 1953, 1969; le sud-ouest du golfe St-Laurent, 1960; la côte atlantique de l'est de la Nouvelle-Écosse, 1962; et la côte du golfe du Maine qui borde la Nouvelle-Écosse et la Nouvelle-Angleterre, 1963. Les données locales concernent un certain nombre d'espèces d'invertébrés pour lesquelles on croit avoir établi de nouvelles bornes de répartition ou qui sont d'un intérêt zoogéographique ou écologique particulier.

Summary

Station data and locality maps are provided for field investigations on the distribution and ecology of littoral marine invertebrates, mainly molluscs and crustaceans, in the following regions: St. Lawrence estuary and Gaspé coast, 1953, 1969; the southwestern Gulf of St. Lawrence, 1960; the Atlantic coast of eastern Nova Scotia, 1962; and the Gulf of Maine coast of western Nova Scotia and New England, 1963. Locality records are provided for a number of invertebrate species that are believed to set new distributional limits, or are of particular interest, zoogeographically or ecologically.

Biographical Notes

E. L. Bousfield

Born in Penticton, B.C., in 1926, Dr. Bousfield graduated from the University of Toronto in Zoology (B.A., 1948; M.A., 1949), and received his Ph.D. from Harvard University (Marine Biology, 1954). He joined the National Museums of Canada in 1950, as Invertebrate Zoologist, and in 1964 became Chief Zoologist. He is the author of over 50 scientific and popular publications, including *Canadian Atlantic Sea Shells* (1960), "Fresh-water Amphipod Crustaceans of Glaciated North America" (1958), and "Haustoriidae of New England (Crustacea: Amphipoda)" (1965). His scientific research interests are primarily in the taxonomy, distribution and ecology of shallow-water amphipod and cirripede crustaceans; estuarine and intertidal ecology; and postglacial dispersal of freshwater and marine invertebrates of Canada.

Diana R. Laubitz

Born in London, England, Diana Laubitz graduated from Cambridge University with a B.A., specializing in Zoology. She came to Canada in 1956, and has been associated with the National Museum of Natural Sciences since 1964. Her research has been concerned primarily with the taxonomy and systematics of the Caprellidea, and she is the author of *Studies on the Caprellidae (Crustacea, Amphipoda) of the American North Pacific* and *The Caprellidae (Crustacea, Amphipoda) of Atlantic and Arctic Canada,* in the Museum's Biological Oceanography series. Recently she has started investigating some of the Gammaridea closely related to this group.

Preface

Since 1950 the senior author has conducted systematic field surveys of littoral marine invertebrate animals, particularly crustaceans and molluscs, of the Atlantic coast of Canada and the adjacent coast of New England. These surveys have provided material for published faunistic studies. Those studies based on surveys prior to 1960 have included regional station data and locality maps (Table 1). The present contribution provides station data and locality maps for regional surveys from 1960 to 1969 (Tables 3–6; Maps 1, 1B–1D). Station data for the St. Lawrence estuary and Gaspé coast region have been given in part by Tattersall (1954); the complete station list and the locality map are included here (Table 2; Map 1A).

Table 1. Littoral Marine Invertebrate Surveys, Eastern Canada (1950–58): Guide to Literature.

Year of survey	Region	Publication of station data, maps
1950	Coastal New Brunswick and Nova Scotia; Miramichi estuary	Bousfield 1952 Bousfield 1954 Bousfield 1955*b*, 1955*c*
1951	Miramichi estuary	Bousfield 1955*b*, 1955*c*
1953	St. Lawrence estuary and Gaspé coast	Tattersall 1954 (part)
1954	Cape Breton Island and Newfoundland	Bousfield 1956*b*
1955	Western Nova Scotia	Bousfield 1956*c*
1956	Western Nova Scotia	Bousfield 1958*b*
1958	Minas Basin and Bay of Fundy	Bousfield and Leim 1960 Bousfield 1962*a*

Publication of station lists is a useful method of avoiding duplication of raw data and map figures where dependent multidisciplinary publications are anticipated (e.g. Dunbar and Grainger 1952; Bousfield and McAllister 1962). The 1960–69 material has already provided published records of polychaete worms (Pettibone 1963*a*, 1963*b*), haustoriid amphipods (Bousfield 1962*b*), ampeliscid and melitid amphipods (Mills 1963, 1964, 1967), caprellid amphipods (McCain 1968), and oyster drills (Medcof and Thomas 1969). The 1953 material provided the basis for a study on regional mysid shrimps (Tattersall 1954), a short study on freshwater gastropod molluscs (Bousfield 1955*a*), and a preliminary regional hydrobiological analysis (Bousfield 1956*a*). Along with survey material listed in Table 1, the 1953 material was incorporated in studies on selected invertebrate groups such as talitrid amphipods (Bousfield 1958*c*), freshwater amphipods (Bousfield 1958*a*) and shallow-water marine molluscs (Bousfield 1960,

1964). The present station data, together with previously published data (Table 1), are incorporated in forthcoming studies on postglacial marine invertebrate distribution (Bousfield and Thomas, in press), gammaridean amphipods of New England (Bousfield, in press), and caprellid amphipods of the northwestern North Atlantic (Laubitz 1972). These and other pertinent studies now in preparation have lent urgency to the publication of the basic station data and primary distributional records in this paper.

Acknowledgements

Many interested persons and research agencies contributed in various ways to the field operations during this extended period. The authors are especially grateful for facilities, equipment and assistance provided by officers of the Fisheries Research Board of Canada, particularly by Dr. R. E. Drinnan, Mr. Stanley Vass and Mr. W. Robichaud during fieldwork in Prince Edward Island, the Magdalen Islands and Shippigan regions, respectively; by Dr. H. E. Corbeil, Dr. P. Brunel and Mr. J. Bergeron, all of Station de Biologie marine, Grande-Rivière, Quebec, during work in the Gaspé region, 1953, and on the Magdalen Islands, 1960; by Dr. Hans Boerger, Mount Desert Island Biological Station, Salisbury Cove, Maine, Dr. A. P. Stickney, U.S. National Marine Fisheries Service, Boothbay Harbor, Maine, and Dr. M. R. Carriker, Marine Biological Laboratory, Woods Hole, Massachusetts, during the New England survey, 1963; and by Dr. René Lavoie, Laval University, Dr. Geoffrey Power, University of Waterloo, Mr. Donald Galienne, Sept-Îles, and Mr. Charles H. Douglas, during field operations along the St. Lawrence north shore in 1969. Sorting and identification of 1960 biological material and compilation of the data were greatly assisted by Mrs. Anne Stamper, Lewes, England. Barbara Bousfield, wife of the senior author, took part in all surveys except that of 1969, and was most helpful in the collection of intertidal molluscs and in field photography. To all these persons and agencies and to others unnamed, the authors extend their sincere thanks.

Methodology

Most of the collections and observations were conducted from the shore at stations accessible by road. Some freshwater streams and lakes and a few terrestrial habitats were sampled. Shore collections were made with long-handled dip nets and small sieves, or by hand-picking between the tidemarks, and at hip-boot depth. Small boats obtained locally were used in sampling the bottoms of lagoons and estuarine channels, particularly during the 1960 field operations. An Ekman bottom-sampler was used effectively on soft mud and sand to depths of over 30 feet (10 metres). A small triangular-frame dredge and a 3-foot iron-frame dredge were usefully employed, the latter mainly on stony and shelly bottoms, to depths of over 50 feet (16 metres). Oyster tongs and oyster rakes were particularly effective on mud and shell bottoms in depths between 5 and 10 feet. A set of standard brass sieves, minimum screen size 1 mm, was used to separate small organisms from muddy and sandy-mud substrata. All materials were fine-sorted into systematic groups, re-preserved, and deposited in the research collections of the National Museum of Natural Sciences, Ottawa.

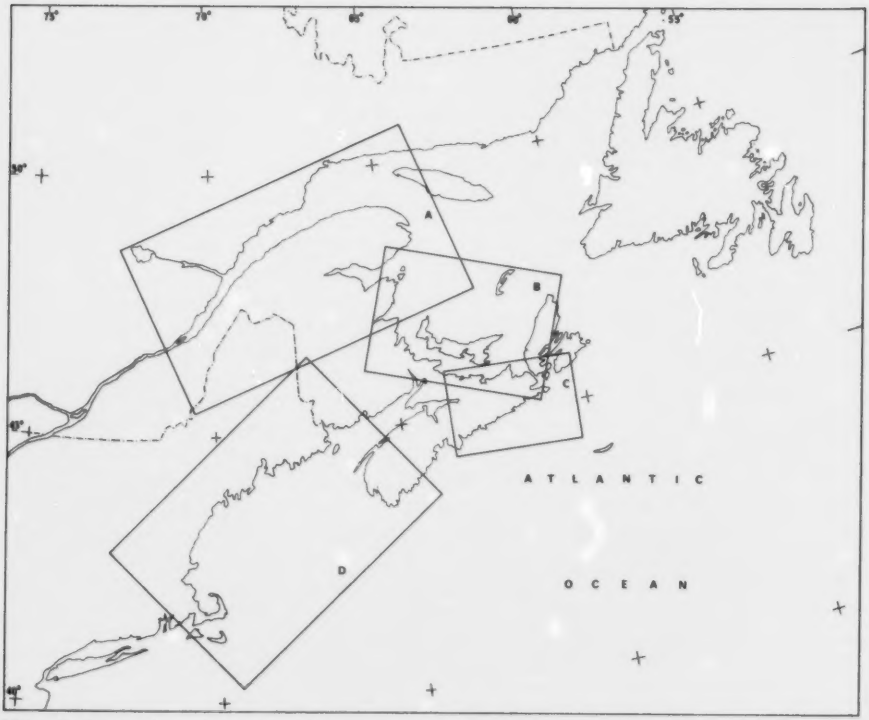
Surface temperatures were recorded with a mercury thermometer accurate to the nearest 0.1 °C, and surface salinities were calculated from float hydrometer readings of specific gravity accurate to the nearest 0.0001 gm/cc. Depths were measured by calibrated line soundings.

Tables

Maps consulted in the construction of the tables are from three main sources:

National Topographic Series, Surveys and Mapping Branch, Department of Energy, Mines and Resources, Ottawa.	Map scale 1: 50,000 (1 mile) 1: 200,000 (4 miles) 1: 400,000 (8 miles)
Hydrographic Charts, Canadian Hydrographic Service, Department of Energy, Mines and Resources, Ottawa.	various
Army Map Service, United States Geological Survey, Department of the Interior, Washington, D.C.	1: 50,000

In some cases, the names of the localities listed have been officially changed since the maps were issued, and may no longer be in familiar use.



Map 1 Collection stations of littoral marine invertebrates; guide to regional station locality maps of eastern Canada and New England

A comprehensive and detailed presentation of the hydrobiology of the Canadian Atlantic and northern New England coastal regions is a desirable result of completed long-term studies, but is beyond the scope of this initial report and station list. However, selected field observations on hydrobiological features of each of the four major subregions (Maps 1, 1A–1D) may be usefully included in this preliminary report.

St. Lawrence Estuary and Gaspé Coast (Tables 2 and 3; Map 1A)

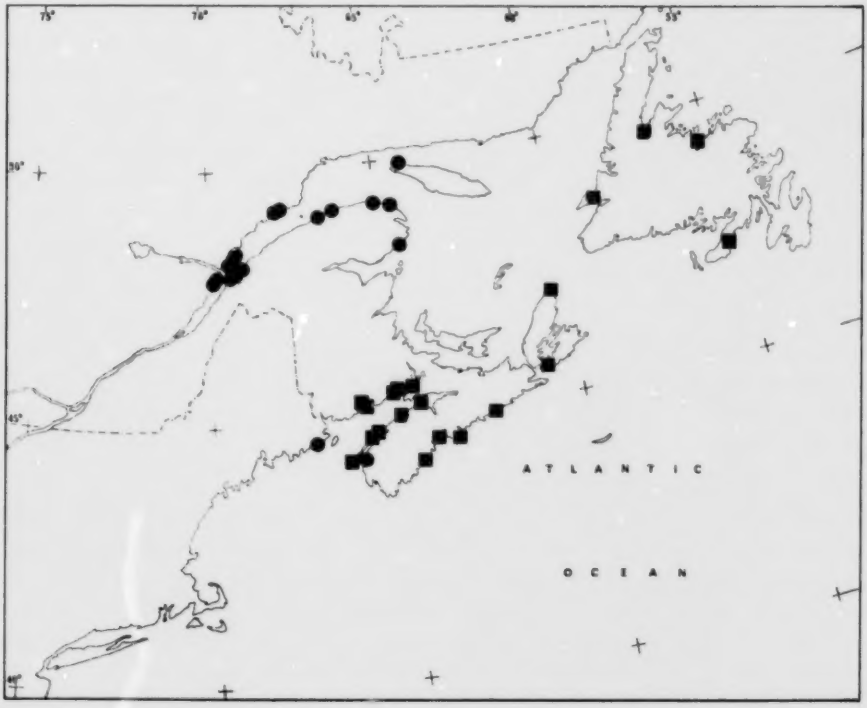
With respect to the St. Lawrence estuary, general hydrobiological features have been presented by Bousfield (1956*a*), Lavoie (1970) and Bourget (1971). The outer Gaspé region and Chaleur Bay region have been listed by Lacroix (1967), Brunel (1970) and Bousfield (1956*a*).

These authors tend to subdivide the estuary proper into three discrete regions. The upper estuary is the tidal freshwater portion, stretching for about 100 miles above the Île d'Orléans; this region is warm in summer and supports a strictly freshwater fauna. Some species (e.g. *Viviparus viviparus* L.) extend significantly landward into the lower part of the broad tidal zone.

The middle estuary comprises the region from the east end of the Île d'Orléans to the mouth of the Saguenay estuary on the north side and to Trois Pistoles on the south side. Salinity and temperature gradients are steep, both horizontally and vertically, and show large seasonal variation. The tidal amplitude is high, but water transparency is very low, particularly along the south shore, where the main seaward thrust of silt-laden fresh water is impelled by the Coriolis force. The shallow-water fauna consists largely of widely eurytopic and hardy arctic-boreal or boreal marine species of both plants and animals. The middle estuary sets downriver limits to freshwater organisms such as crayfish (*Orconectes*), cladocerans (*Bosmina*), limnaeid and physid gastropods, and unionid bivalves, the shells of which are ice-rafted onto the same beaches as marine assemblages, even as far east as Bic.

The lower estuary, from the Saguenay to Pointe des Monts and Cap Chat, is marked by low summer surface temperatures and high surface salinities. Intense summer upwelling of very cold deep water immediately seaward of the Saguenay sill produces very high nutrient levels at the surface and very high primary productivity of benthic algae, particularly along the adjacent south shore. A strong inflow of fresh water from numerous large rivers along the north shore appreciably lowers surface salinities there in spring and early summer. Tidal amplitudes are lower and water transparencies higher than in the middle estuary. The shallow-water fauna of the lower estuary (and Saguenay fiord) contains a high proportion of arctic and subarctic endemics (e.g. *Gammarellus homari, Gammaracanthus loricatus, Atylus carinatus*), much higher than would be expected at such a low latitude (48°–49°N).

In a study of breeding seasons and larval attachment in sessile marine invertebrates (e.g. *Balanus*), Bourget (1971) concluded that primary productivity in the middle estuary is very low because low salinities and high turbidities drastically limit the numbers of species of algae and their ability to photosynthesize. His temperature and salinity data show that, in the lower estuary, surface temperatures become progressively lower and salinities become higher during summer as the estuarine nutrient pump action (upwelling) is accelerated by spring runoff and summer westerly winds; however, the mecha-



Map 2 Distribution of subarctic and temperate indicator species:
Gammarus setosus
● New record
■ Published record

nism tends to shut down in winter because of the thick ice-cover, reduced freshet, and reduced wind effects, and the surface water tends to stratify and become relatively low in salinity. Bourget (1971) also found that the reproductive period of several arctic-boreal and boreal species occurs very late within the estuary. Spawning periods are comparable to those of low arctic latitudes and are much later than in the Gulf of St. Lawrence and outer Maritimes coastline.

Coastal waters of the northwestern portion of the Gulf of St. Lawrence, northwest of Anticosti Island, are somewhat warmer and more brackish in summer than adjacent coastal regions. Mid-summer surface temperatures are 14°–16°C and salinities 20–28‰, and the inshore fauna contains several boreal elements, such as *Asterias vulgaris, Idotea balthica, Ampithoe rubricata, Pleusymtes glaber, Thais lapillus,* and *Littorina littorea*, that are lacking within, or penetrate only partly into, the lower estuary.

Southwestern Gulf of St. Lawrence (Table 4; Map 1B)

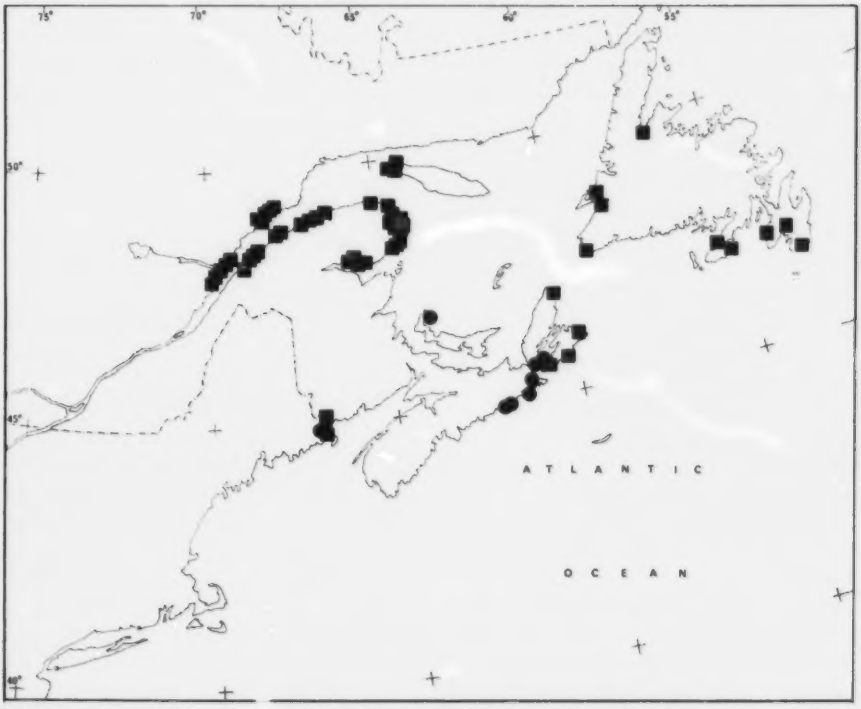
The southwestern Gulf of St. Lawrence is essentially a region of sandy-mud and eelgrass lagoons, soft-red sandstone bedrock, and beautiful sandy beaches. Some estuaries are primarily mud-bottomed, particularly in the North-

umberland Strait region, where tidal amplitudes are somewhat higher than on the open Gulf coast. Summer surface temperatures are everywhere above 15°C and usually above 18°C, and salinities are 25–28‰. Thermal stratification is very pronounced, permitting warm-water (but winter-hardy) species to occupy a thin surface zone along shores and in estuaries, and cold-water faunas to exist in summer-cold bottom water close inshore. Winter ice is heavy, appearing in early December and frequently persisting until mid-May, followed by rapid vernal heating of the surface water layer. Ice scouring contributes significantly to the rapid erosion of cliff faces and to the low density of sessile intertidal fauna and flora throughout the region (Stephenson and Stephenson 1954).

The eastern end of Prince Edward Island is essentially a summer-cold and winter-mild area. Unlike most Island estuaries, Georgetown Harbour is a deep, wide inlet whose open mouth is not cut off from the Gulf by barrier bars. Prevailing summer westerlies blow surface water out to sea and create inshore upwelling of cold salt water. In winter, the upwelling water is comparatively warm, and icing is less severe than elsewhere. The summer-cold bottom conditions are unfavourable to certain species (e.g. *Balanus improvisus*) having warm-water pelagic larvae that must be retained within the estuary.

The Magdalen shallows, or "Magdalen pocket" (of Abbott 1968), contains the main northernmost populations of the warm-water, or Virginian, fauna that includes the "oyster" benthic invertebrate association. These species meet their northern limit at Chaleur Bay (e.g. B17, B20, Restigouche estuary). The oyster association includes the crustaceans *Neopanope texana sayi, Palaemonetes vulgaris, Balanus improvisus, Corophium insidiosum, Caprella penantis*, and *Leptochelia rapax*; the gastropods *Nassarius obsoletus, Odostomia bisuturalis, Mitrella lunata, Retusa canaliculata, Pyramidella fusca*, and *Crepidula fornicata*; the bivalves *Mulinia lateralis, Mysella planulata, Volsella demissus, Petricola pholadiformis*, and *Mercenaria mercenaria*; and representatives of other invertebrate groups, such as *Molgula manhattensis* (Tunicata), *Polydora websteri* and *Eteone heterpoda* (Polychaeta), and *Microciona prolifera* (Porifera).

Particularly noteworthy records for warm-water crustaceans in the southwestern Gulf region are: *Melita nitida* (S27, S29); *Ampithoe longimana* – lagoons of the outer coast of P.E.I. (e.g. P2, P42), Magdalen Islands (M5, M6), George Bay (S7), and Buctouche (B5); *Ovalipes ocellatus* (B23, B24); and *Rhithropanopeus harrisi* (S23, S27, P8). Extending or confirming the molluscan ranges summarized by Bousfield (1960) are the following: the gastropods *Triphora nigrocincta* (S25, S35, P43, B27); *Cerithiopsis greeni* (S25, S35, P12); *Bittium alternatum* – New Brunswick coast north to B5 and sporadically to B17, east in Nova Scotia to George Bay, widely around P.E.I., but not on the Magdalens (see also Map 5); *Odostomia seminuda* (S34, P5); *Haminoea solitaria* – mainland north to B17, widely around P.E.I., but not on the Magdalens; the nudibranch *Elysia chlorotica* (S31, B22, B31); the bivalves *Cummingia tellinoides* – mainland north to B8, not on the Magdalens; *Pandora gouldiana* (M4, B20); and a large beach deposit of fossil oyster shells at M8, previously noted by Medcof, Clarke and Erskine (1965). The boreal species *Zirphaea crispata* is common along peaty margins of the northeastern New Brunswick coast. Specimens of *Saccoglossus kowalewskii* (Agassiz) were confirmed



Map 3 Distribution of subarctic and temperate indicator species: *Mysis gaspensis*
● New record
■ Published record

from station P34 by Dr. N. Burdon-Jones (*personal communication*).

Unexpected records of live shallow-water populations of cold-water or subarctic species include: *Mysis gaspensis* (S11, S16, P19, M4–M6, B11), *Balanus balanus* (P37, M10, B24), *Mesodesma arctatum* (P26, M1, M10, B15), *Arctica islandica* (P25, M11, M12), *Volsella modiolus* (P37, M11), *Margarites helicinus* (P37), and *Buccinum undatum* (P25, P27, M12, B16). Apparently, very sharp vertical and seasonal thermoclines permit both warm-water and cold-water faunas to exist virtually side by side in this region. The Magdalen Islands did not yield living specimens of *Crassostrea virginica, Mercenaria mercenaria, Volsella demissa, Nassarius obsoletus,* cerithiid snails, *Neopanope texana sayi, Palaemontes vulgarus,* or *Balanus improvisus*. The absence from the Magdalen Islands of these abundant and dominant indicators of Virginian summer conditions suggests that the name "Magdalen pocket" may not be entirely applicable or suitable.

Atlantic Coast of Eastern Nova Scotia (Table 5; Map 1C)

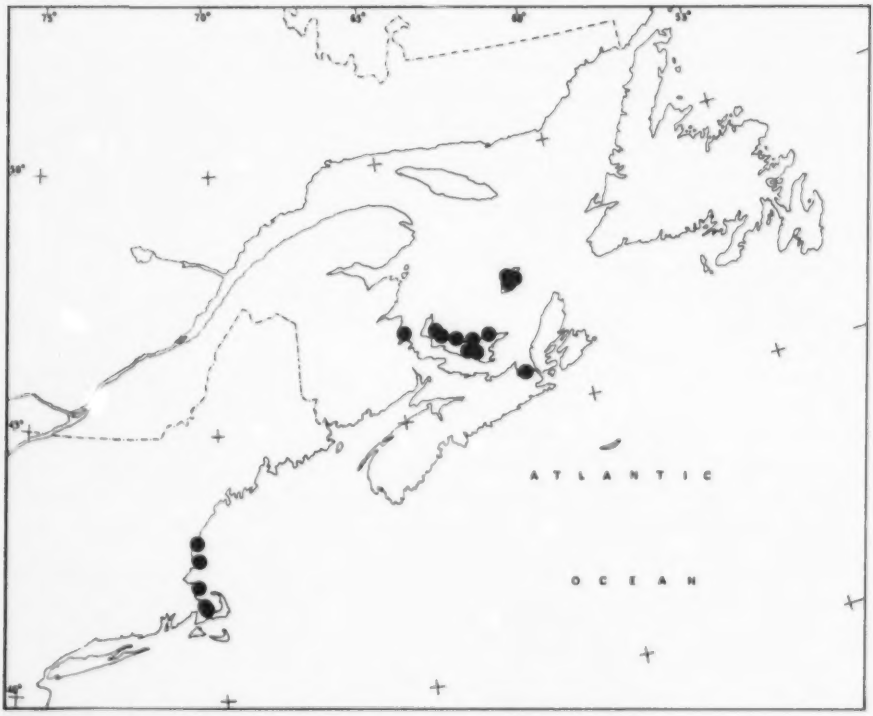
The outer coast of eastern Nova Scotia, particularly from Clam Harbour to Indian Harbour, is essentially a cold-water region. Here are found the lowest summer surface temperatures and the greatest seasonal range of air temperatures.

The rigorous continental climate accounts mainly for the low species diversity, the low incidence of winter thermophiles, and the rarity of warm-water endemics. The influence of the substratum on faunal composition is marked. The regional bedrock is igneous and acidic, forming a sharp escarpment (a more than 50-foot drop) a few miles inland from the outer coast. The estuaries are thus short and lack extensive sandy-mud tidal flats. Cold water penetrates up the channels, upwelling is induced by prevailing offshore weather systems, and the surface flow of fresh water into the estuary is low in nutrients and pH. All these factors combine to produce conditions unsuitable for warm-water estuarine endemics, particularly those with pelagic larvae. Only Oyster Pond and Ostrea Lake today offer suitable, if tenuous, physical conditions for completion of the life cycles of such organisms (see also Medcof et al. 1965).

The axis of an estuary may have an important bearing on its faunal composition. If the axis is elongate and at right angles to the ocean front, surf and cold water penetrate well into the bay in summer; the fauna is composed largely of cold-water or boreal eurytherms and lacks endemics. Along somewhat more mature coastlines, estuaries tend to broaden at the mouth and are partly protected by barrier bars and shallow sills. With moderate protection from surf, inner waters stratify in summer, and a few warm-water species may be found there. Along mature coastlines, lagoons with sandy barrier bars develop, the axis of the estuary becomes more or less parallel to the coast, and inner waters are completely protected from surf and cold-water invasion. Summer stratification and a warm-water plankton-retention mechanism characterize the circulation. Most of the estuaries of eastern Nova Scotia can today be included among the first two categories described, whereas very few (e.g. Cole Harbour) fit into the third category or close to it. In hypsithermal times (c. 7000 bp), however, lowered sea levels exposed extensive offshore sandy archipelagos that had probably developed mature estuarine profiles, and thereby provided a sort of stepping-stone northward passageway for warm-water estuarine endemics into the Gulf of St. Lawrence (see also Bousfield and Thomas, in press).

The warm-water or "oyster" fauna occurs sporadically along the eastern Nova Scotia coast, although surprisingly widespread are *Corophium insidosum* (absent only from A36–A42 and A54–A60), *Bittium alternatum* (A4, A6, A17, A22, A23, A27, A31, A32, A34, A47, A66, A70), and *Tellina agilis* (including A48, A53, A58, A59, A61, A66, A68, A69). Other notable records among the crustaceans are *Haustorius canadensis* (A17), *Caprella penantis* (A16, A73), *Leptochelia rapax* (A5, A22, A34, A37, A61, A70, A79), and *Mysis stenolepis* (A4, A16, A22, A61, A63, A66, A69).

An apparent lack of *Balanus improvisus, Ampithoe longimana*, and warm-water decapods probably reflects the unsuitability of present-day summer temperatures and estuarine circulation for prolonged pelagic larval development and retention. Most warm-water molluscs occur in pockets west of Sheet Harbour or in the Chedabucto Bay and Cape Breton regions, with occasional specimens at intervening localities (ice-rafted shells), e.g.: the gastropods *Mitrella lunatia* (A6, A17, A22, A32), *Retusa canaliculata* (A25, A31, A32, A34), *Crepidula fornicata* (A22, A34, A43), *Nassarius obsoletus* (A6, A17, A22, A27, A32, A70, A71, A79), and *Haminoea solitaria* (A27); the bivalves *Crassostrea virginica* (A1, A6), *Mysella planulata* (A17, A19), *Volsella demissa* (A1,



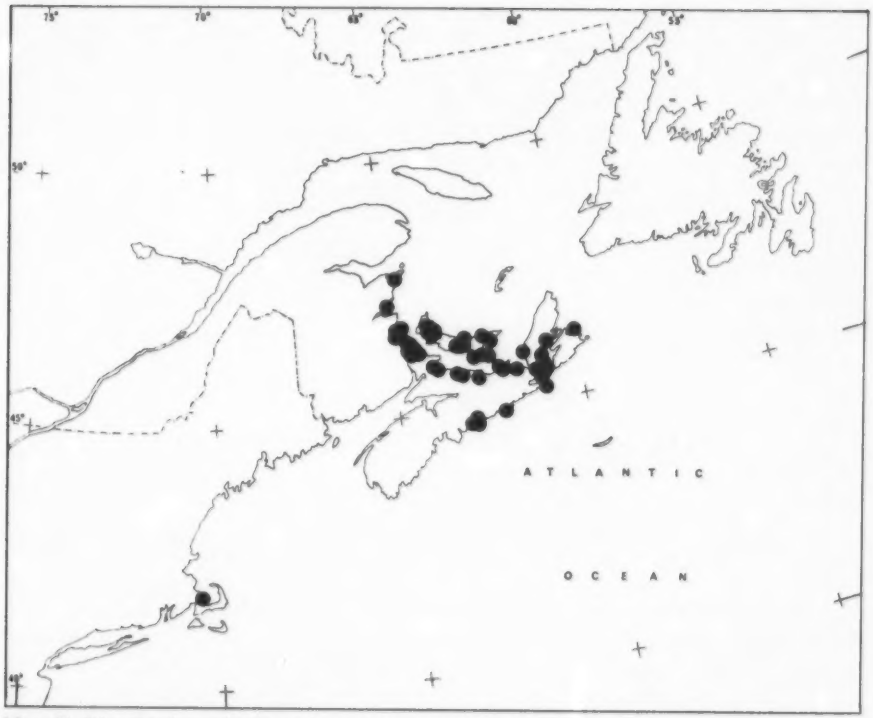
Map 4 Distribution of subarctic and temperate indicator species: *Ampithoe longimana*

A5, A6, empty valves at A52), *Pandora gouldiana* (A22, A33), *Petricola pholadiformis* (A6, A22, empty valves at A66), and *Pitar morrhuana* (A19, A27, A35, A43). Winter-mild thermophiles occur eastward along the coast as follows: *Amphiporeia virginiana* (to A50), *Marinogammarus finmarchicus* (to A29), *Bathyporeia quoddyensis* (A10, A12, A73), *Chiridothea caeca* (to A50), and *Orchestia grillus* (to A60). *Orchestia gammarella* was taken at A22, and the pipefish *Syngnathus fuscus* at A71.

Cold-water and subarctic species are not uncommon close inshore, especially in the region east of Sheet Harbour to Cape Canso (A43–A60). These include the crustaceans *Mysis gaspensis* (A31, A34, A35, A60, A64, A65), *Balanus balanus* (A73), *Mancocuma stellifera* (A9, A17, A18, A21, A30, A31, A42, A73), *Pontoporeia femorata* (A27, A35), and *Pagurus pubescens* (A44); the gastropods *Buccinum undatum* (A22, A42), *Skenea planorbis* (A51, A66, A74, A75, A76), and *Margarites helicinus* (A22, A35, A42, A44, A54, A58, A63, A76); and the bivalves *Mesodesma arctatum* (A9, A12, A17, A19, A64, A73), and *Volsella modiolus* (A8, A33, A35, A39, A42, A60, A63).

Northern New England and Western Nova Scotia (Table 6; Map 1D)

The New England coast north of Cape Cod is a boreal or cold-temperate region that may be divided into two zoogeographical subregions. On the basis of surface-water characteristics and faunal composition, we may recognize (1) the



Map 5 Distribution of subarctic and temperate indicator species: *Bittium alternatum*

section north from Penobscot Bay by its uniformly cold (less than 12°C) summer surface temperatures and relatively high salinities, in which boreal and subarctic faunal elements are dominant; and (2) the section south of Penobscot Bay containing pockets of warm brackish waters in which Virginian faunal elements are dominant.

The Cape Cod region has long been recognized as a practical northern limit of the main populations of the Virginian fauna and a southern limit of the boreal fauna. In actuality, however, many of the warm-water invertebrates extend northward into northern New England and cold-water invertebrates to Long Island Sound and southward. Notable northern New England records among the warm-water arthropods are *Limulus polyphemus* (M32, M33), *Balanus improvisus* (M33, M35), *Pagurus longicarpus* (M31, M32), *Rhithropanopeus harrisi* (M58), *Exosphaeroma oregonensis* (M75), *Heteromysis formosa* (M73), *Melita nitida* (M35, M39), *Ampithoe valida* (M35), *Corophium acherusicum* (M33), *Gammarus palustris* (M58), and *Orchestia uhleri* (M52, M53). Extending northward into western Nova Scotia are *Palaemonetes pugio* (S17), *Mysis stenolepis* (S3, S11), *Praunus flexuosus* (S9), *Carcinides maenas* (S1, S2, S17, S19), *Libinia emarginata* (S1), *Corophium insidiosum* (S9, S17), and *C. lacustre* (head of St. Marys Bay).

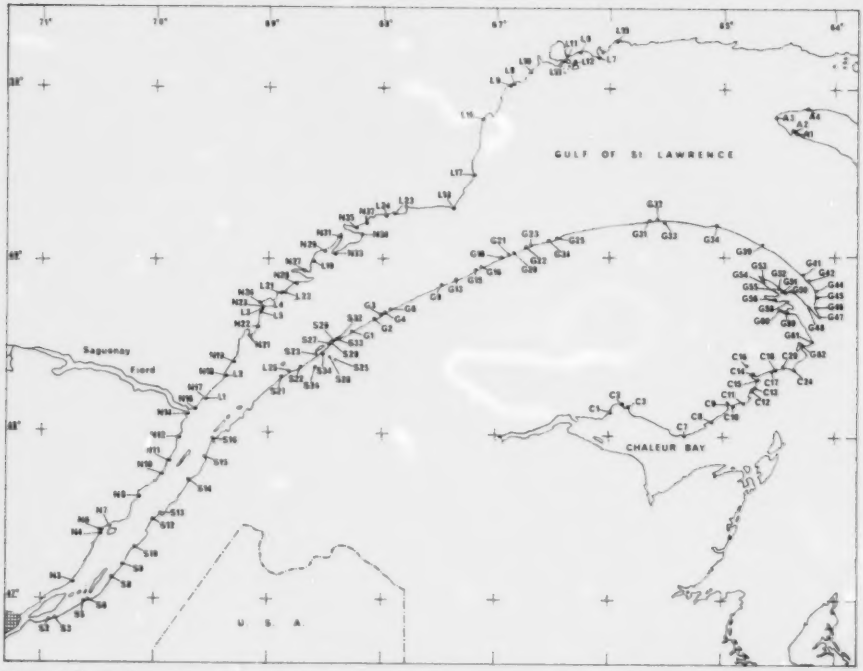
Records of winter-mild thermophiles include *Orchestia gammarella* (S4, M7), *Ligia oceanica* (S4, S6, S16, M56), and

Littorophiloscia vittata (S11, S13, S17, S20, M34) (see also Lemos de Castro 1965).

Noteworthy records of warm-water molluscs include the gastropods *Polinices duplicata* (M71, M73), *Urosalpinx cinerea* (S9, M32, M33), *Bittium alternatum* (M77), *Haminoea solitaria* (M19, M20), *Nassarius obsoletus* (S1, S17, M1, M20), *Crepidula fornicata* (S1, S9, M19, M20, shell at M6), *Mitrella lunatia* (S1, S9, M32, M33), and *Ovatella myosotis* (S11, M33); the bivalves *Crassostrea virginica* (M39, M57), *Mercenaria mercenaria* (S1, S8, M19, M32, M33), *Volsella demissa* (S8, S17, M20, M32–M34), *Petricola pholadiformis* (S9, M20, M32, M33), *Pandora gouldiana* (S1, S8, S9), *Mysella planulata* (S9), and *Tellina agilis* (S1, M1, M30); and the squid *Loligo pealii* (S1).

In the lower part of the tidal zone, along Maine and Scotian coasts bordering the entrance to the Bay of Fundy, are found a number of cold-stenothermal invertebrates that occur subtidally elsewhere: *Cancer borealis, Balanus balanus, Melita dentata, Pontoporeia femorata, Anonyx sarsi, Volsella modiolus, Arctica islandica, Astarte undata, Mesodesma arctatum, Buccinum undatum*, and *Margarites helicinus*. Especially noteworthy records of cold-water species include *Mysis gaspensis* (M10, M11), *Mancocuma stellifera* (M9), *Gammarus setosus* (S12, M5), and southern interdidal populations of *Cancer borealis* and *Buccinum undatum* (M72).

Geographical and Ecological Data for the Collections



Map 1A Collection stations in the St. Lawrence estuary and Gaspé coast regions

Table 2. St. Lawrence Estuary and Gaspé Coast (1953)
Key to station localities on Map 1A: A – Anticosti Island; C – Chaleur Bay; G – Gaspé (Ste-Flavie to Percé); S – south shore, St. Lawrence estuary; N – north shore, St. Lawrence estuary

Sta No.	Date	Locality	Lat N	Long W	Depth	Temp °C	Salinity ‰	Habitat
A1	Aug. 9	Port-Menier, SE of wharf	49°48′	64°21′	LW to HW	13.8	31.2	Tidal flats, limestone, HW drift
A2	Aug. 12	Port-Menier, pier	49°49′	64°22′	HW	—	—	Gravel beach
A3	Aug. 11	Baie Ste-Claire	49°53.5′	64°31′	LW to HW	7.8	30.6	Pebble and sand beach, tidal flats
		House ruins			Terrestrial	—	—	Under stones
		Woodlands			Terrestrial	—	—	Under logs
		Small lake			Terrestrial	—	—	Under boards in and around dried lake
A4	Aug. 10	2 miles NE of Cap de Rabast	49°56′	64°05′	LW to HW	11.0	30.5	Pebbles and limestone flats, igneous boulders
		Small stream				20.0	Brackish to fresh	
C1	Aug. 7	Maria, old wharf	48°10′	66°00′	LW to HW	13.1	15.9	Stones at base of pilings, pebble beach
C2	Aug. 7	Cascapédia estuary	48°15.5′	65°54′	LW to HW	16.5	18.4	Mud flats
C3	Aug. 6	R. Petit Cascapédia, at New Richmond	48°10′	65°50.5′	LW	14.9	1.4	River and tidal flats
C4	Aug. 7	R. Petit Cascapédia	48°10.5′	64°46′	1 ft	16.1	Fresh	Stones
C7	Aug. 6	Paspébiac, old wharf	48°01′	65°14′	HW	—	—	Sand beach
C8	Aug. 6	St-Godefroi, west	48°04′	65°07′	HW	—	—	Under logs, fine-sand beach
C9	July 31	Port-Daniel, river mouth	48°11′	64°58′	MW	18.8	Brackish	Mud flats, eelgrass
		Head of estuary	48°12′	64°58′	MW	—	Brackish	Mud flats, salt marsh
C10	July 31	Port-Daniel, east	48°11′	64°57′	HW	18.8	27.9	Fine-sand beach
C11	Aug. 6	Gascons	48°12′	64°52′	HW	—	—	Under logs, fine-pebble beach
C12	July 31	Newport, beach opposite Gull I.	48°15′	64°45′	HW	—	—	Fine-sand beach
C13	Aug. 6	Newport light	48°17′	64°43′	HW	—	—	Coarse-sand beach
C14	Aug. 3	Chandler, head of bay at R. du Grand Pabos	48°20′	64°44′	LW to HW	20.4	19.2	Marshy beach, mud flats
C15	Aug. 2	Chandler, mouth of bay	48°20′	64°42′	LW to HW	15.2	25.1	Coarse sand, rocks
C16	Aug. 3	Lac des Sept Îles	48°21′	64°48′	<3 ft	18.8	FW	Stones
		R. des Sept-Îles, ½ mile below lake	48°21′	64°47′			FW	
C17	Aug. 3	Ste-Adelaide-de-Pabos	48°21′	64°37′	HW	—	—	Sand and pebble beach
C18	Aug. 6	Petit Pabos estuary	48°22′	64°35′	HW	—	—	Sand beach
C19	July 30	Bog Pond, 4 miles NW of Grande-Rivière	48°25′	64°32′	<5 ft	22.8	—	Bog margin, woody detritus, grass roots
C20	July 30	Grande R., 1 mile above mouth	48°24′	64°21′	1 ft	17.8	Fresh	Stones
C24	Aug. 5	Anse-du-Cap-d'Espoir	48°25′	64°19′	HW	—	—	Sand beach
G1	July 9	1 mile W of Ste-Flavie	48°36′	68°15.5′	LW to MW	14.5	27.5	Boulders
G2	Aug. 17	R. Mitis	48°37.5′	68°08′	1-2 ft	17.6	Fresh	Stones, rapids
G3	Aug. 18	Baie du Petit Mitis	48°41′	68°02′	LW to HW	13.8	27.7	Sandstone, slate and mud flats

Sta No.	Date	Locality	Lat N	Long W	Depth	Temp °C	Salinity ‰	Habitat
G4	Aug. 18	R. Tartigou	48°45′	67°47′	1 ft	16.8	Fresh	Stones
G6	Aug. 26	Pointe au Naufrage	48°46′	67°47′	LW to HW	10.0	27.5	Coarse sand at HW, shale and boulders
G9	Aug. 24	Matane, W of wharf	48°51′	67°32′	LW to HW	9.7	26.9	Sand with stones
G11	Aug. 22	R. Petite Matane	48°49′	67°27.5′	1 ft	16.0	Fresh	Pebbles
G12	Aug. 22	Small stream 5 miles E of Petite-Matane	48°51′	67°21.5′	1 ft	11.2	Fresh	
G13	Aug. 22	Ste-Félicité, W of wharf	48°54′	67°21′	LW to HW	9.8	28.8	Rocks and boulders
G15	Aug. 20	Ruisseau à la Loutre	48°56′	67°09′	MW to HW	—	Brackish	Boulders at MW, woodlands at HW
		Cascades at mouth				13.1	—	
G16	Aug. 23	La Lorraine Cove	48°57.5′	67°07.5′	LW to HW	8.8	27.6	Rocks, boulders, sand
G18	Aug. 19	Small tributary of R. des Grands Méchins	49°00′	66°58′	1 ft	11.0	Fresh	Stones
		Woodlands				—	—	Under logs and leaf mould
G20	Aug. 21	Capucins estuary	49°02.5′	66°51.5′	LW to HW	—	Brackish	Tidal flats
		R. at mouth				16.2		Stones
G21	Aug. 25	Capucins Pond	49°02′	66°53′	1 ft	—	—	Sand, mud
G22	Aug. 25	2 miles W of Cap Chat	49°05′	66°45.5′	Subtidal to HW	10.5	28.5	Sand, pebbles, boulders
G23	Aug. 23	Cap Chat, estuary	49°06′	66°41′	LW	—	Brackish	Sand and mud flats
G24	Aug. 23	Pointe Ste-Anne-des-Monts	49°07.5′	66°33′	LW to HW	10.2	27.4	Rocks and boulders
G25	Aug. 23	R. Ste-Anne estuary	49°07′	66°30.5′	LW to HW	—	Brackish	Pebbles, mud
G26	Aug. 16	Tributary of R. Ste-Anne	49°00′	66°21′	1 ft	10.4	Fresh	Waterfalls, under mosses and stones
		Woodlot at stream						
G27	Aug. 16	R. Ste-Anne	48°59′	66°19′	1-2 ft	15.5	Fresh	Rapids, under stones
G29	Aug. 15	Small stream 2 miles W of Marsoui	49°13′	66°07′	1 ft	11.4	Fresh	Under stones and pebbles
G31	Aug. 15	Mont-St-Pierre	49°14′	65°47′	LW to MW	12.4	27.2	Slate bedrock
G32	Aug. 14	Mont-Louis	49°14′	65°44′	HW	—	—	Sand, stones, shells
G33	Aug. 14	Lac de l'Anse Pleureuse	49°13.5′	65°37′	1 ft	12.0	Fresh	Fine gravel along shore
G34	Aug. 14	Rivière-la-Madeleine	49°15′	65°19.5′	LW to HW	14.6	27.2	Sand and pebble spit
G39	Aug. 13	Grand Étang, harbour	49°08′	64°44.5′	LW to HW	12.4	Brackish to 27.2	Slate and stone
G41	July 25	SE of Rivière-au-Renard	48°59.5′	64°23′	LW to HW	13.7	27.1	Slate, pebbles, sand
G42	July 26	Anse au Griffon	48°56.5′	64°18.5′	LW to HW	14.0	27.2	Shale, pebbles, sand
G44	July 26	Jersey Cove	48°53.5′	64°14.5′	LW to HW	11.9	27.4	Slate, boulders
	July 22	R. de l'Anse au Griffon 5 miles above mouth				13.4	Fresh	
G45	July 26	Cap des Rosiers, light	48°51′	64°12′	MW to HW	13.2	26.8	Shale, pebble beach
G46	July 26	Cap Bon Ami Park	48°47′	64°12′	Terrestrial	—	—	Under stumps and logs
G47	July 25	Cape Gaspé	48°45′	64°10′	MW to HW	14.7	25.7	Boulders, sand

Sta No.	Date	Locality	Lat N	Long W	Depth	Temp °C	Salinity ‰	Habitat
G48	July 25	Little-Gaspé	48°47.5′	64°14′	LW to HW	15.8	27.1	Pebbles, sand
G50	July 25	Peninsula-Gaspé	48°51′	64°25′	LW to HW	15.0	26.2	Sand beach
G51	July 27	Bay inside Peninsula-Gaspé	48°51′	64°26′	LW	24.6	22.9	Sandy mud flats, estuarine
G52	July 27	Gaspé Bay, 2 miles W of Peninsula-Gaspé	48°52′	64°28′	LW to HW	20.4	8.3	Sand, mud flats, sand and pebble beach
G53	July 24	Darmouth R., 3 miles above St-Majorique	48°54′	64°37′	1 ft	19.8	Fresh	Pebbles, gravel
G54	July 24	St-Majorique	48°53′	64°33.5′	LW	20.5	7.4	Sandy estuary
G55	July 27	Gaspé Bay, N arm	48°52′	64°32′	MW to HW	20.3	24.9	Sand spit
G56	July 28	Gaspé Bay, S arm	48°49′	64°31′	LW	19.4	21.1	Estuary, pebble beach, eelgrass
G58	July 28	Gaspé Bay, sandy spit at neck	48°49′	64°24′	MW to HW	18.6	26.0	Fine sand
G59	Aug. 8	Haldimand, south	48°46.5′	64°25.5′	HW	—	—	Sand bar
G60	July 28	R. St-Jean, mouth	48°46′	64°29′	1 ft	20.0	Fresh	Pebbles, gravel
G61	July 29	Pointe St-Pierre	48°38′	64°11′	LW to HW	14.8	27.0	Sand beach
G62	July 29	Barachois	48°37′	64°17′	MW to HW	16.1	26.0	Rocks, sand
S2	Sept. 9	St-Michel beach	46°52.5′	70°54.5′	MW	—	—	Shale, pebbles, sand
S3	Sept. 9	St-Vallier	46°54′	70°49.5′	LW to HW	18.7	0.3	Slate, pebbles, sand, bedrock
S5	Sept. 10	Montmagny, west	46°58.5′	70°38.5′	LW to HW	20.5	0.8	Slate and silt, bedrock
S6	Sept. 10	Montmagny, river at St-Pierre bridge	46°59′	70°33.5′	1 ft	17.8	Fresh	Silt, stones
S8	Sept. 10	L'Islet wharf	47°08′	70°22.5′	LW to HW	17.8	1.9	Slate bedrock, silt
S9	Sept. 11	St-Jean-Port-Joli	47°13′	70°16.5′	LW to HW	15.8	4.9	Slate bedrock, mud, sand
S10	Sept. 11	St-Roch-des-Aulnets wharf	47°19′	70°10.5′	LW	15.0	8.3	Mud, bedrock pools
	July 16	Wharf	47°19′	70°10.5′	LW	24.0	8.3	Boulders, mud
S12	July 16	Pointe aux Orignaux	47°29′	70°01.5′	LW to HW	12.8	19.7	Boulders, sand, mud
S13	July 17	Cap au Diable	47°32′	69°56′	LW to HW	19.8	19.2	Rocks, boulders, sand, mud
S14	July 18	Pointe des Caps	47°43.5′	69°40.5′	LW to HW	25.0	20.8	Boulders, stones, mud
S15	July 19	Pointe de la Rivière du Loup	47°50′	69°34′	LW to HW	15.0	22.6	Slate, boulders, mud
S16	July 15	Cacouna I., W end	47°56.5′	69°31′	LW to MW	10.4	24.4	Boulders
		E end	47°57′	69°30′	MW to HW	—	—	Sand flats, beach
S17	July 20	R. Verte, 3 miles W of St-Modeste	47°51′	69°26′	1 ft	20.8	Fresh	Stones, gravel
S18	July 20	R. Verte, 2 miles W of St-Modeste	47°51′	69°25′	1 ft	15.2	Fresh	Under stones
S21	July 13	St-Fabien, near Alcide Rock beacon	48°18.5′	68°54′	LW to HW	9.7	26.2	Coarse sand, rocks, boulders
S22	July 13	Bic, Bicoques, wharf ruins	48°22.5′	68°43.5′	LW to HW	10.0	27.1	Boulders
S23	July 12	Bare I., W end	48°26.5′	68°35.5′	LW to HW	14.8	26.2	Rocks, mud flats

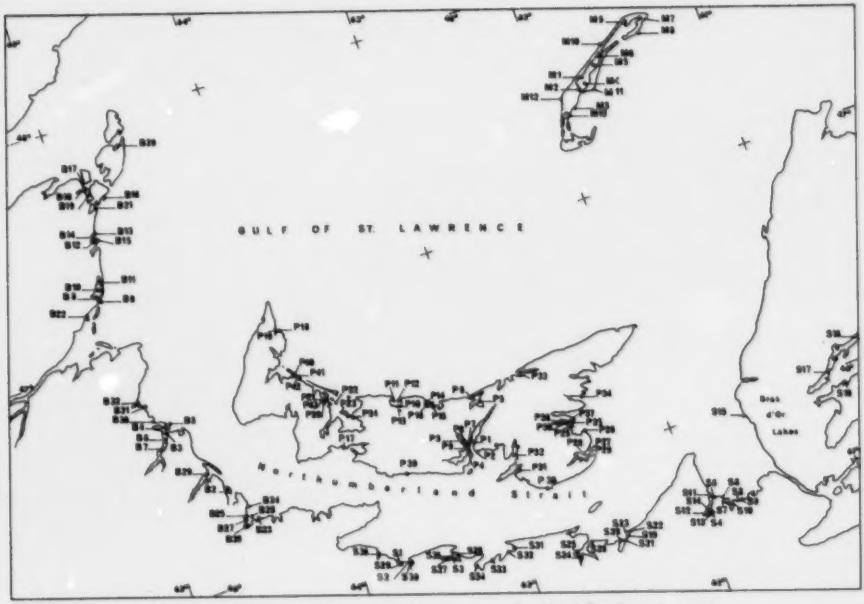
Sta No	Date	Locality	Lat N	Long W	Depth	Temp °C	Salinity ‰	Habitat
S24	July 10	Rimouski R., 13 miles above Rimouski	48°23′	68°33′	1 ft	19.1	Fresh	
S25	July 11	Branch of Rimouski R., 3 miles SE of Rimouski	48°27.5′	68°24.5′	1 ft	17.0	Fresh	
S26	July 8	Small stream 2 miles SE of Rimouski	48°27.5′	68°27′	1 ft	20.0	Fresh	Stones, rapids
S27	July 8	Pointe-au-Père, W side	48°31′	68°28′	LW to HW	7.8	28.0	Rocks, boulders
	July 11	E side			LW to HW	13.2	24.1	Rocks, boulders
S28	July 8	2 miles E of Pointe-au-Père	48°31.5′	68°27′	LW	13.0	27.0	Sand beach
	July 9				LW to HW	—	—	Rocks, boulders
S29	July 10	4 miles E of Pointe-au-Père	48°32′	68°26′	LW to HW	10.9	—	Boulders, mud, *Fucus*
S30	July 12	Stream at Ste-Luce Tourist Bureau	48°33′	68°24′	1 ft	27.5	Fresh	Mud
S31	July 12	Stream 3 miles W of St-Donat	48°31′	68°22′	1 ft	10.5	Fresh	
S32	July 9	Stream 2 miles NW of St-Marcellin	48°29′	68°19′	1 ft	12.5	Fresh	Stones
S33	July 10	Ste-Luce, west	48°33′	68°23.5′	MW	10.9	25.9	Rocks, boulders
S34	July 7	Rimouski, estuary	48°26.5′	68°32.5′	LW to HW	16.5	13.9	Muddy sand, kelp, fucoids
N3	Sept. 8	Cap Tourmente	47°05′	70°48′	LW to HW	19.2	2.3	Rocks, mud flats
N4	Sept. 8	Baie St-Paul, outer bay, S side	47°25′	70°29.5′	LW to HW	10.3	20.1	Muddy sand flats, *Fucus*
N5	Sept. 6	Small tributary of R. Baie-St-Paul	47°28′	70°34′	1 ft	10.7	Fresh	Stones, wood
N6	Sept. 6	Baie St-Paul, W of wharf	47°25.5′	70°29.5′	HW	—	—	Sand beach
N7	Sept. 6	St-Joseph-de-la-Rive	47°27′	70°22′	LW to HW	11.9	17.3	Boulders, muddy sand
N8	Sept. 7	Pointe au Pic	47°37.5′	70°08.5′	LW to HW	7.5	25.0	Boulders, pebbles, sand flats
N10	Sept. 5	Port au Saumon wharf	47°45′	69°57′	LW to HW	11.3	19.2	Mud, sand, pebbles
N11	Sept. 5	St-Simeon, beach E of wharf	47°50.5′	69°52.5′	LW to HW	9.1	22.1	Rocks
					HW			Sandy beach
N12	Sept. 4	R. de la Baie des Rochers	47°57′	69°49′	1 ft	15.2	Brackish to fresh	Boulders, mud
N13	Sept. 4	Petit Lac Louis	48°02′	69°49′	>1 ft	18.8	Fresh	Sand, wood chips
N14	Sept. 4	Baie Ste-Catherine	48°07′	69°43′	LW to HW	10.4	20.3	Coarse sand, rock
N16	Sept. 3	Baie du Moulin à Baude	48°09′	69°39.5′	LW to HW	8.3	24.9	Sand, sand flats
N17	Sept. 2	Pointe à John	48°13.5′	69°33′	LW to HW	13.0	29.7	Sandy, gravelly mud
N18	Sept. 2	Les Escoumains, estuary	48°21′	69°24′	LW to HW	9.6	—	Stones, sandy mud
N19	Sept. 1	Îlets Penchés	48°24.5′	69°19′	LW to HW	12.6	28.1	Clay mud over sand, flats
N21	Sept. 1	Pointe de Mille-Vaches	48°34.5′	69°08′	MW, HW	10.4	28.3	Sand beach

Sta No.	Date	Locality	Lat N	Long W	Depth	Temp °C	Salinity ‰	Habitat
N22	Aug. 31	Portneuf	48°38.5′	69°05.5′	LW to HW	—	—	Sand flats
N23	Aug. 31	Forestville wharf, at Rocky Point	48°44.5′	69°03′	LW to HW	8.4	27.6	Sand beach and breakwater
N24	Aug. 31	Small stream W of Baie Laval	48°45.5′	69°04′	1 ft	12.6	Fresh	Falls and rapids
N26	Aug. 30	Îlets Jérémie	48°53′	68°47.5′	LW to HW	—	—	Sand beach, mud
N27	Aug. 30	Bersimis	48°56′	68°39′	HW	—	—	Sand beach
N29	Aug. 28	Outardes estuary, Rageneau wharf	49°03.5′	68°33.5′	MW	—	Brackish	Mud
N31	Aug. 28	Chutes aux Outardes	49°08′	68°23′	1 ft	—	Fresh	Sand, mud
N33	Aug. 28	Pointe aux Outardes	49°02.5′	68°26′	LW to HW	11.2	26.0	Sand, muddy sand flats
N34	Aug. 29	Pointe LeBel	49°10′	68°12′	LW to HW	18.3	4.6	Sand beach, flats
N35	Aug. 29	Old mill, Manicouagan	49°11′	68°14.5′	LW to HW	—	Brackish	Rocks, mud flats
N37	Aug. 27	Baie Comeau, cove N of wharf	49°15′	68°08.5′	LW to HW	9.7	27.0	Boulders, sand

Table 3. St. Lawrence Estuary (1969)
Key to station locality on Map 1A: L – lower estuary, Gulf of St. Lawrence

Sta No.	Date	Locality	Lat N	Long W	Depth	Temp °C	Salinity ‰	Habitat
L1	July 30	Pointe à John, NE of wharf	48°13.5′	69°33′	LW, HW	12.8	24.2	Coarse sand, silt, pebbles, fucoids, *Laminaria*, pools in igneous bedrock
L2	July 30	Les Escoumains, NW of Harbour I.	48°21′	69°24′	LW	—	Brackish	Mud, sand
L3	July 30	Forestville beach, inside wharf	48°44.5′	69°03′	HW	—	Brackish	Coarse to medium black sand
L4	July 31	Forestville, shore and breakwater	48°44.5′	69°03′	LW, HW	—	—	Sand, fucoids, igneous bedrock pools
L5	July 31	Forestville, outer flats at mouth of river	48°44′	69°03.5′	LW	14.5	Nearly fresh to brackish	Coarse to medium sand, river detritus
L6	Aug. 1	Baie de la Boule, near Hall Point	50°12.5′	66°14.5′	LW to HW	14.8	27.4	Medium to coarse wave-exposed sand
L7	Aug. 1	Pointe de Moisie, mouth of R. Moisie	50°11.5′	66°04′	LW, HW	20.5	Brackish	Very coarse sand, HW debris
L8	Aug. 2	Port-Cartier, at Dreyfus terminal	50°02′	66°48′	LW	—	—	Oil-polluted muddy tidal flats over bedrock
L9	Aug. 2	Port-Cartier-Ouest	50°01′	66°53′	LW, HW	15.6	19.5	Igneous bedrock pools, boulders, sand, *Fucus*, *Cladophora*
L10	Aug. 2	R. Brochu	50°06.5′	66°42′	HW	—	—	Steep wave-exposed sand beach
L11	Aug. 3	Pointe aux Basques	50°11′	66°22′	LW, HW	14.5	—	Coarse-to-medium-sand beach, HW debris
L12	Aug. 4	Île Grosse Boule, at north end	50°09.5′	66°17.5′	LW, HW	15.6	c.27.0	Sand, boulders, fucoids, *Corallina* on bedrock, HW debris
L13	Aug. 4	Île Grande Basque, NE bay	50°10.5′	66°22′	LW to MW	14.5	—	Coarse sand, fucoids, bedrock
L14	Aug. 5	Lac des Rapides	50°18′	66°25′	Shore to 2 ft	20.2 8.0	Fresh Spring	Clear acidic water, fine-sand bottom
L15	Aug. 6	Amory Cove, near mouth of R. Matamec	50°18′	65°57′	LW to HW	15.0	24.5	Tidal lagoon, fucoids, sand beach, igneous bedrock pools
L16	Aug. 7	Baie des Homards (R. Pentecôte N.)	49°49′	67°08′	HW	16.0	High, brackish	Sand, fucoids, *Enteromorpha*, pools in igneous bedrock
L17	Aug. 7	Îlets Caribou	49°30′	67°14′	MW, HW	Warm	Brackish	River bed, coarse sand, boulders, *Fucus*, HW debris
L18	Aug. 7	Pointe des Monts	49°19′	67°23′	LW to HW	15.5	27.1	Igneous bedrock, boulders, gravel, sand, *Fucus*
L19	Aug. 8	Off Papinachois	49°00′	68°38′	Naturalist dredge 12-14 ft 15-16 ft 17-20 ft	 13.5 — —	High, brackish — —	 Sand Muddy sand, kelp Clay, clay sand

Sta No.	Date	Locality	Lat N	Long W	Depth	Temp °C	Salinity ‰	Habitat
L20	Aug. 9	Lac Cinq Cents	49°17′	68°07′	Shore to 2 ft	22.0	Fresh	Stones, logs, dead leaves
L21	Aug. 11	Cap Colombier, E end of Baie du Plongeur	48°49.5′	68°53′	LW	10.6	—	Mud and boulder flats, silty sand, fucoids
L22	Aug. 11	Cap Colombier, E bay	48°49.5′	68°51.5′	Naturalist dredge			
					15 ft	10.6	—	Sand, filamentous algae
					20 ft	—	—	Sand
					25 ft	—	—	Sand, stones
L23	Aug. 12	Franquelin	49°17′	67°54′	LW to subtidal	12.6	—	Sand flats, boulders, *Fucus*, kelp, wood chips
L24	Aug. 12	Mistassini estuary	49°17′	67°57′	HW	—	Brackish	Sand, gravel, HW-drift debris
L25	Aug. 13	Cap à l'Orignal	48°22′	68°47.5′	LW to HW	12.2	—	Slate bedrock, stones, silt, kelp, fucoids



Map 1B Collection stations in the southwestern Gulf of St. Lawrence

Table 4. Southwestern Gulf of St. Lawrence (1960)
Key to station localities on Map 1B: S – Nova Scotia; P – Prince Edward Island; M – Magdalen Islands; B – New Brunswick

Sta No.	Date	Locality	Lat N	Long W	Depth	Temp °C	Salinity ‰	Habitat
S1	June 16	Port Howe	45°51′	63°45′	LW	—	—	Tidal flats
S2	June 16	Pugwash, below bridge	45°51′	63°40′	LW	19.0	—	Coarse sand, *Spartina* flats
S3	June 17	Wallace	45°49′	63°28′	MW	—	—	Mud and eelgrass flats
S4	June 20	E shore Antigonish Harbour, at Chisholm Farm	45°38′	61°54′	LW	27.3	Brackish	Mud and eelgrass flats
S5	June 20	Dunn Beach, outer shore	45°41′	61°53′	LW to HW	17.0	—	Coarse sand, gravel, pebbles
S6	June 21	Monks Head, outer shore	45°39′	61°49.5′	LW to HW	13.5	29.3	Muddy sand, stones, pebbles, *Fucus, Chorda*
S7	June 21	Pomquet Harbour, western pond	45°38.5′	61°50.5′	LW	18.8	27.8	Fine muddy sand, *Chorda*, eelgrass, filamentous algae
S8	June 22	Bayfield, wharf	45°38.5′	61°45.5′	LW	18.4	29.5	Stones, hard-packed sand
S9	June 22	Bayfield, beach	45°39′	61°45.5′	LW	19.2	—	Hard-packed sand flats
S10	June 22	Pomquet Harbour, channel mouth	45°38′	61°47.5′	LW to HW	19.5	28.0	Sand, pebbles, eelgrass
S11	June 23	Mahoney Beach, inner shore	45°42′	61°54.5′	LW	21.9	25.4	Coarse sand, gravel, eelgrass
S12	June 23	Antigonish Harbour, 2 miles below Antigonish	45°38′	61°57.5′	LW	—	Nearly fresh	*Spartina* flats, pebbles, mud
S13	June 23	Chisholm Cove	45°38′	61°55′	7 ft Ekman grab LW shore	20.3	28.4	Black muck, eelgrass
S14	June 24	South R. estuary, opposite Chisholm Cove	45°38′	61°54.5′	5-6 ft Dredge	18.8	—	Black muck, shells, eelgrass
S15	June 24	Cape Susan Cove, at shore road	45°57.5′	61°32′	LW	21.5	—	Mud and eelgrass flats
S16	June 26	Nyanza, Bras d'Or Lake	46°05.5′	60°53′	LW	18.6	Low, brackish	Gravel, dead eelgrass, *Enteromorpha*
S17	June 26	St. Patricks Channel, South Bay	45°59.5′	60°59′	MW	—	—	Sand and eelgrass beach
S18	June 26	Red Point, near Jamesville	45°56′	60°52′	LW to HW	21.0	—	Sand and gravel spit, mud, shells
S19	June 27	Merigomish Harbour, ¼ mile E of Merigomish	45°38.5′	62°24.5′	LW	18.6	29.1	Mud, muddy sand, stones, eelgrass, pilings
S20	June 28	Big I., at Merigomish Harbour entrance	45°39′	62°28′	LW	18.4	29.1	Sand, stones, fucoids, *Chorda*
S21	June 28	Big I., inside entrance hook	45°38′	62°27′	LW to HW	—	—	*Spartina* flats, muddy sand
S22	June 28	Merigomish Harbour, N side near head	45°40.5′	62°21′	LW	22.5	27.1	Loose sand, eelgrass

Sta No.	Date	Locality	Lat N	Long W	Depth	Temp °C	Salinity ‰	Habitat
S23	June 29	Merigomish Harbour, channel, Masa's Beach	45°39′	62°24.5′	10-25 ft	—	—	Black muck and eelgrass
S24	June 29	Abercrombie North, East River	45°38.5′	62°42′	LW	—	—	Muddy sand and stones
S25	June 29	Seabreeze Point, opposite Pictou	45°39′	62°42.5′	LW	18.5	28.8	Sandy mud, stones, eelgrass, *Chorda*
S26	June 29	Pictou Landing Cove	45°40′	62°38′	LW to MW	21.5	—	Mud, stones, *Spartina*
S27	July 5	Wallace Harbour, at bridge	45°49.5′	63°29′	LW to HW	24.0	27.5	Mud, gravel, stones, eelgrass
S28	July 5	Smith Point, near Oak I.	45°51′	63°24′	LW	—	—	Sand flats, shells, eelgrass
S29	July 6	Port Philip, at bridge	45°51′	63°44′	LW	19.6	22.8	Mud, stones, eelgrass
S30	July 6	Pugwash Harbour, at bridge	45°51′	63°40′	LW	20.3	—	Mud, stones, eelgrass
S31	July 7	River John, ½ mile below bridge	45°45′	63°04′	LW, HW	22.3	Variable	Mud, stones, eelgrass
S32	July 7	Murray Beach	45°46′	63°07′	LW, HW	—	—	Sand flats
S33	July 7	Barachois Harbour, at bridge	45°44′	63°17′	LW	—	—	Mud flats, eelgrass
S34	July 7	Bayhead, beach at mouth of Millard Creek	45°45′	63°22′	LW, HW	23.8	29.8	Muddy sand, eelgrass
S35	July 8	Wallace Harbour, mid-channel, off wharf	45°49′	63°28′	15-33 ft Ekman grab	—	—	Mud, sand, shells, dead eelgrass
S36	July 8	Northport	45°56′	63°52′	LW	22.5	29.1	Sand, sandy mud, eelgrass
S37	Aug. 22	Ottawa House Beach, near Parrsboro	45°22′	64°20′	HW	—	—	Steep, coarse, gravelly, sand and shingle beach
P1	July 9	Hillsborough Bay, at Charlottetown RR bridge	46°14′	63°07′	LW	18.6	29.2	Mud, clay, silt, eelgrass, shells
P2	July 10	Keppoch Beach	46°12′	63°07′	LW	19.2	29.7	Fine sand, stones, *Fucus, Chorda*
P3	July 11	Yorke estuary, at causeway	46°16′	63°11′	LW	20.4	3.2	Clay, mud, stones, *Enteromorpha*
P4	July 11	Rocky Point, at ferry wharf	46°13′	63°09′	LW	18.5	29.5	Sandy mud, stones, eelgrass
P5	July 12	Blooming Point, Tracadie Bay	46°23.5′	62°59′	LW to MW	22.6	29.5	Sand, sandy mud, eelgrass, *Ruppia*
P6	July 13	Tracadie Harbour, at mouth	46°25′	63°03′	LW	21.0	28.6	Sand, dead eelgrass
P7	July 13	Charlottetown Harbour, Yorke estuary mouth	46°13.5′	63°09.5′	LW	21.0	—	Sandy mud, eelgrass
P8	July 14	Yorke estuary, off Charlottetown	46°15′	63°09′	1-3 ft Oyster tong hauls	—	—	Mud, dead eelgrass, shells
P9	July 14	Yorke estuary, mid-channel	46°14′	63°10′	30-40 ft Ekman grab	—	—	Black muck, dead eelgrass

Sta No.	Date	Locality	Lat N	Long W	Depth	Temp °C	Salinity ‰	Habitat
P10	July 15	Stanley Bridge, at landing stage	46°28′	63°27.5′	HW	—	—	Sand, dead eelgrass, under logs
P11	July 16	New London Bay, mid-channel	46°30′	63°28′	10-15 ft Dredge	22.0	—	Mud, muddy sand
P12	July 16	New London Bay, E side	46°29.5′	63°26.5′	6-7 ft Dredge	—	—	Sandstone, eelgrass, fucoids, *Chondrus*
P13	July 16	New London Bay, ½ mile above bridge	46°28′	63°28′	12-14 ft Ekman grab	—	—	Fine black mud
P14	July 17	Rustico Harbour, channel off Rustico	46°27.5′	63°17.5′	6-8 ft Ekman grab	19.8	—	Sandy mud, shells
P15	July 17	Rustico Bay, off Little Harbour wharf	46°27′	63°16′	5-8 ft Ekman grab	—	—	Sandy mud, dead eelgrass
P16	July 17	North Rustico, channel below wharf	46°27.5′	63°18′	3-4 ft Oyster tong hauls	—	—	Mud, chord grass, eelgrass
P17	July 18	Linkletter Shore, Bedeque Bay	46°24′	63°51′	MW to HW	—	—	Mud, sand, sandstone bedrock
P18	July 18	E Tignish Run, outer beach	46°57′	63°59′	HW	—	—	Sand, shells
P19	July 18	Tignish Run, near head, at bridge	46°57′	64°01′	1-3 ft	25.5	12.0	Sandy gravel, eelgrass
P20	July 21	Bideford estuary, near Biological Station	46°37′	63°55′	10-14 ft Ekman grab	20.8	—	Fine mud, shells, dead eelgrass
P21	July 22	Indian Spit, Lennox I.	46°36′	63°51′	30-36 ft Ekman grab	—	—	Sandy mud, detritus
P22	July 22	Malpeque Bay, mouth of Bideford Bay	46°35′	63°48′	25 ft Ekman grab	—	—	Fine mud, dead eelgrass
P23	July 22	Curtain I., off N W point	46°32′	63°47.5′	8 ft Dredge	—	—	Sandstone, algae
P24	July 22	Malpeque Bay, Little Rock oyster bed	46°31′	63°46′	15 ft Dredge	—	—	Sand, oyster shells
P25	July 24	Lower Montague, below lighthouse	46°10′	62°32′	HW	20.0	—	Sandstone, sand
P26	July 24	Panmure I., N end of isthmus	46°08.5′	62°28′	LW	20.2	28.7	Sandstone, sand, filamentous algae
P27	July 25	Murray Harbour N, inside breakwater	46°03′	62°28′	LW to HW	—	—	Sand, clay mud, gravel, debris
P28	July 25	Murray Harbour mouth, inner side of spit	46°03′	62°30′	LW to HW	—	—	Sand, dead eelgrass
P29	July 25	Lower Murray Harbour, above wharf	46°01′	62°30′	LW	20.4	29.0	Muddy sand, sand, eelgrass
P30	July 25	Wood I., ferry terminal	45°57′	62°45′	MW to HW	—	—	*Salicornia* and *Spartina* flats
P31	July 26	Pinette Harbour, at hwy bridge	46°04′	62°54′	LW	19.5	—	Muddy sand, eelgrass
P32	July 26	Orwell Cove, at wharf	46°09′	62°53′	MW	20.0	28.6	Sand, shells, *Spartina*, *Fucus*
P33	July 26	Morell wharf, St. Peters Bay	46°26′	62°42′	LW	21.5	—	Sand, eelgrass

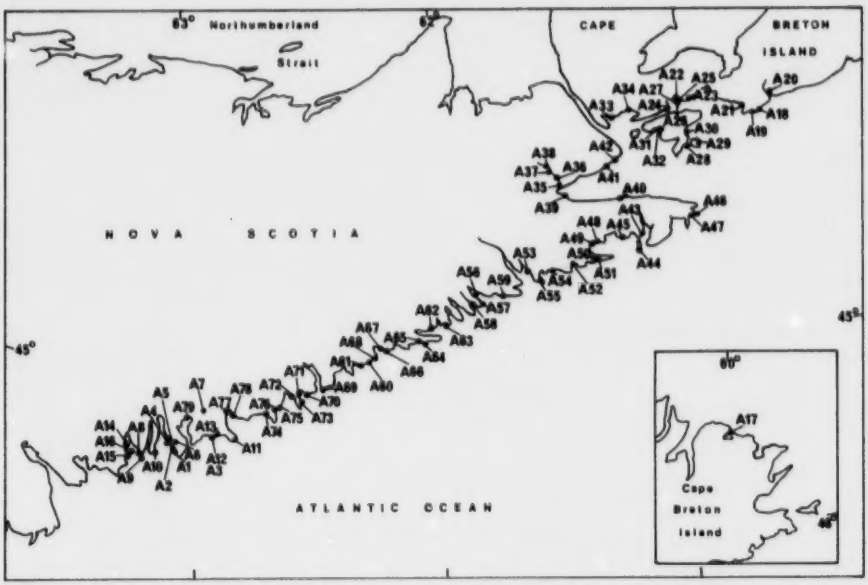
Sta No.	Date	Locality	Lat N	Long W	Depth	Temp °C	Salinity ‰	Habitat
P34	July 26	Annandale wharf	46°15.5′	62°25′	LW	20.9	—	Sand, eelgrass, *Fucus*
P35	July 27	Georgetown Harbour, at channel buoy	46°10.5′	62°32.5′	30-35 ft Ekman grab	—	—	Sand, mud
P36	July 27	Brudenell estuary, opposite Provincial Park	46°12′	62°35.5′	7-10 ft Ekman grab	—	—	Muddy sand, dead eelgrass
P37	July 27	Shaw Point, Georgetown Harbour	46°11′	62°33′	6-8 ft Dredge	—	—	Sandstone, algae
P38	July 27	Montague estuary, inside Shaw Point	46°10.5′	62°33.5′	9 ft Oyster tongs	—	—	Sand, dead eelgrass
P39	July 27	Victoria, at wharf	46°13′	63°29.5′	MW to HW	20.0	—	Sand flats, sandstone, rocks
P40	July 28	Conway Narrows, Cascumpeque Bay	46°44′	64°00′	MW	—	—	Sand, eelgrass, shells
P41	July 28	Conway Narrows, shoal opposite large house	46°44′	63°59′	½-2 ft Ekman grab	—	—	Sand, eelgrass, shells
P42	July 28	Conway Narrows, at Flat I.	46°43′	63°58′	1-3 ft Ekman grab	—	—	Sand, eelgrass
P43	July 29	Bideford estuary, at Biological Station	46°37′	63°55′	10-12 ft Ekman grab	21.0	—	Soft ooze
M1	Aug. 15	House Harbour, Dune-du-Nord	47°26′	61°50′	MW to HW	—	—	Fine sand
M2a	Aug. 15	House Harbour, channel off Le Grand Ruisseau	47°24.5′	61°52′	10 ft Ekman grab	20.0	—	Mud, dead eelgrass
M2b	Aug. 15	House Harbour, at Le Grand Ruisseau wharf	47°25′	61°52′	Surface 1 ft Oyster tongs	—	—	Mud, eelgrass
M3	Aug. 15	Pond, N side of Pleasant Bay	47°21′	61°53.5′	LW	—	—	Soft mud, eelgrass, fucoids
M4	Aug. 16	House Harbour, E side channel	47°24.5′	61°51′	10-15 ft Dredge	—	—	Sandy mud, shells
M5	Aug. 16	House Harbour, N channel	47°26′	61°47.5′	6-10 ft Ekman grab	—	—	Sandy mud, dead eelgrass
M6	July 16	Alright Channel, at causeway	47°28′	61°46.5′	LW	—	—	Sand, stones, eelgrass
M7	July 16	Oyster Pond, NE end, inside barrier beach	47°33.5′	61°32′	HW	—	—	Fine sand, shells, eelgrass
M8	July 16	Grand Étang Harbour, at Old Harry wharf	47°34.5′	61°29′	MW	—	—	Sandstone, eelgrass
M9	July 16	Grosse Île, near Leslie	47°37.5′	61°31.5′	HW	—	—	Sand at outlet of stream
M10	July 16	Wolf I., N end	47°32′	61°43′	HW	—	—	Sand dunes, shells
M11	July 16	South Beach, near wharf	47°24′	61°45′	HW	—	—	Fine sand, shells
M12	July 16	Étang-du-Nord, at wharf	47°22′	61°57.5′	HW	—	—	Fine-sand beach, *Chondrus* debris
M13	July 16	Basques Harbour, N entrance	47°20.5′	61°56′	HW	—	—	Sand, shells

Sta No	Date	Locality	Lat N	Long W	Depth	Temp °C	Salinity ‰	Habitat
B2	Aug. 1	Cocagne I., near Cormierville, inner shore	46°24′	64°36′	MW	25.9	26.4	Mud, coarse sand, eelgrass
B3	Aug. 2	Richibucto Harbour, channel off Fagan Point	46°41.5′	64°52′	25 ft Ekman grab	—	—	Sand, shells
B4	Aug. 2	Richibucto Harbour, channel below NW arm	46°42′	64°51′	30 ft Ekman grab	—	—	Sand, stones, shells
B5	Aug. 2	Richibucto Harbour, inside North Beach	46°43′	64°49′	1-4 ft Ekman grab	—	—	Sand flats, eelgrass
B6	Aug. 2	Richibucto Harbour, off Jardine Beach	46°40′	64°52′	12-20 ft Ekman grab	—	—	Sandy mud, mud, dead shells
B7	Aug. 2	Richibucto, estuary at Rexton Bridge	46°39′	64°52.5′	55-60 ft Ekman grab	—	—	Woodchips, mud
B8	Aug. 3	Tabusintac Lagoon, Stymas Cove	47°18′	64°57.5′	10-12 ft Oyster rake	18.9	27.5	Sand, peat, shells, eelgrass
B9	Aug. 3	Tabusintac I., inside channel	47°17.5′	64°57′	6-10 ft Oyster rake	—	—	Sand, eelgrass
B10	Aug. 3	Wishart Point, channel off wharf, Tabusintac Lagoon	47°20′	64°57′	12-30 ft Ekman grab	—	—	Clay mud, sand, shells
B11	Aug. 3	Brantville wharf	47°22′	64°56.5′	LW	23.0	—	Soft sandstone, mud, eelgrass, fucoids
B12	Aug. 4	Tracadie Lagoon, channel below Tracadie	47°31′	64°54′	20 ft Ekman grab	—	—	Sand
B13	Aug. 4	Tracadie Lagoon, N channel	47°33′	64°53′	1-6 ft Oyster rake	—	—	Sand, mud, shells, eelgrass
B14	Aug. 4	Tracadie Lagoon, old wharf	47°32′	64°54′	LW	19.2	28.3	Muddy sand, shells, eelgrass
B15	Aug. 4	Tracadie outer beach, at causeway	47°30′	64°52′	HW	—	—	Sand, shells
B16	Aug. 4	Little Pokemouche Lagoon, near mouth	47°41.5′	64°44′	LW	22.0	Variable	Sand, eelgrass, mussel beds
B17	Aug. 5	St-Simon Inlet, North Branch channel	47°45′	64°49′	10-25 ft Ekman grab	19.2	26.6	Sandy mud, shells
B18	Aug. 5	St-Simon-Nord, channel above church	47°45′	64°51.5′	4-6 ft Oyster tongs	—	—	Eelgrass, oyster beds
B19	Aug. 5	St-Simon-Sud, opposite Biological Station	47°44′	64°47′	9-14 ft Ekman grab	—	—	Sandy mud, stones, shells, sponges
B20	Aug. 5	Miscou Harbour, near Portage Bay	47°52′	64°33′	LW, HW	21.0	—	Sandy mud, sandstone, shells, eelgrass
B21	Aug. 5	Pokemouche Lagoon, S side	47°38.5′	64°49′	LW	—	—	Peat, sand
B22	Aug. 6	Neguac wharf	47°14.5′	65°05′	LW	18.9	27.4	Mud, muddy sand, stones, eelgrass
B23	Aug. 7	Parlee Beach, Shediac Bay	46°14′	64°30′	HW	—	—	Sand

Sta No.	Date	Locality	Lat N	Long W	Depth	Temp °C	Salinity ‰	Habitat
B24	Aug. 7	Bourgeois Office	46°19′	64°31′	LW to HW	—	—	Sand flats, sandstone blocks, eelgrass
B25	Aug. 7	Grande-Digue, at wharf	46°17.5′	64°33′	LW	27.5	27.2	Mud, muddy sand, eelgrass
B26	Aug. 14	Shediac Harbour, channel off wharf	46°14′	64°32.5′	10 ft Oyster tongs	—	—	Mud, eelgrass
B27	Aug. 14	Shediac Harbour, off Indian I.	46°15.5′	64°33′	6-10 ft Oyster tongs	—	—	Shells, sandy mud, eelgrass
B28	Aug. 14	Shediac Harbour, channel opposite Pointe du Chêne	46°15′	64°32′	12 ft Ekman grab	21.5	28.2	Sand, shells
B29	Aug. 22	Buctouche Harbour, mouth of Little Buctouche River	46°30′	64°41′	LW	24.0	—	Muddy sand, eelgrass
B30	Aug. 23	Richibucto Bay, at St-Oliver	46°46′	64°55′	HW	21.5	—	Sandy mud, eelgrass
B31	Aug. 23	Richibucto Bay, Callander Beach	46°47.5′	64°54.5′	MW	21.5	—	Sand, eelgrass
B32	Aug. 23	South Kouchibouguac, estuary at mouth	46°51′	64°57′	LW	21.6	—	Eelgrass, sandstone

Table 5. Atlantic Coast of Eastern Nova Scotia (1962)
Key to station locality on Map 1C: A – outer coast of eastern Nova Scotia, and Cape Breton Island

Sta No.	Date	Locality	Lat N	Long W	Depth	Temp °C	Salinity ‰	Habitat
A1	July 4	Upper Oyster Pond	44°42′	63°04′	LW to HW	—	Brackish	Tidal pond at LW level
A2	July 4	Pleasant Point, E beach	44°41′	63°04′	HW	—	—	Sand, rocks, seepage
A3	July 5	Clam Harbour beach	44°43.5′	62°52′	HW	—	—	Surf-exposed fine sand
A4	July 6	Ostrea Lake, Musquodoboit Harbour	44°43′	63°04′	LW	12.5	Brackish	Mud and eelgrass flats, *Fucus*, boulders
A5	July 6	Ostrea Lake, at mouth of Frost Brook	44°43′	63°04.5′	LW to MW	—	Low, brackish	Acid fresh water, boulders, fucoids
A6	July 6	Oyster Pond, above bridge	44°41.5′	63°03.5′	LW to HW	c.15.0	Brackish	Boulders, shells, filamentous algae, fucoids, HW debris
A7	July 6	Lake Charlotte	44°47.5′	62°57.5′	Terrestrial	—	—	Mixed woods
A8	July 9	Beach opposite Conrod I.	44°41.5′	63°13′	MW to HW	—	—	Sand, gravel, salt-marsh flats, HW debris
A9	July 10	Meisner Head, outer beach	44°40.5′	63°12.5′	LW	9.9	29.2	Boulders, gravel, sand, *Fucus*
A10	July 11	Martinique Beach	44°41.5′	63°09′	LW to HW	11.6	29.1	Boulders, fine sand, HW rock pools
A11	July 11	Little Harbour	44°42.5′	62°51′	MW	13.1	—	Sandy mud, stones
A12	July 12	Clam Harbour beach	44°43′	62°52′	LW to HW	13.1	25.1	Surf-exposed fine sand, igneous bedrock, HW pools
A13	July 12	Clam Harbour, at head	44°44′	62°53′	MW to HW	—	—	Muddy sand and eelgrass estuary, acid fresh water
A14	July 13	West Chezzetcook	44°42′	63°15.5′	LW to HW	—	—	Salt marsh, HW debris
A15	July 13	Chezzetcook Inlet, at Dyke Rd. bridge	44°41.5′	63°15′	LW	18.9	—	Salt-marsh flats, eelgrass, mud, stones
A16	July 13	Chezzetcook Inlet, opposite Conrod I.	44°41.5′	63°14.5′	LW	15.9	17.5	Sandy mud, eelgrass
A17	July 17	Lingan Harbour, Cape Breton I., at mouth of estuary	46°14′	60°02′	LW	18.9	—	Surf, sand, stones, detritus, eelgrass, *Chorda*
A18	July 18	Point Michaud Beach, NE end	45°34′	60°40′	LW to HW	13.2	29.0	Metamorphic rock, flat sand, fucoids
A19	July 18	Point Michaud lagoon, at outflow	45°34′	60°41′	LW to HW	20+	—	Sand, fine gravel
A20	July 18	Grand R. estuary, 1½ miles above mouth	45°37′	60°39′	LW to MW	—	Low, brackish	Eelgrass, mud
A21	July 19	L'Ardoise Beach, bay	45°36′	60°45.5′	LW to HW	14.4	25.3	Sand and mud flats, eelgrass, filamentous algae on stones
A22	July 19	Bourgeois Inlet, E arm	45°38′	60°57′	LW to HW	15.4	27.9	Sandstone, mud, eelgrass, fucoids, stones at HW level
A23	July 19	False Bay, near head	45°38′	60°56.5′	LW	—	—	Mud and eelgrass flats
A24	July 20	Lennox Passage, at Grandique Point	45°35.5′	61°01′	LW	13.2	28.4	Sandstone, sandy mud, eelgrass, *Chorda*



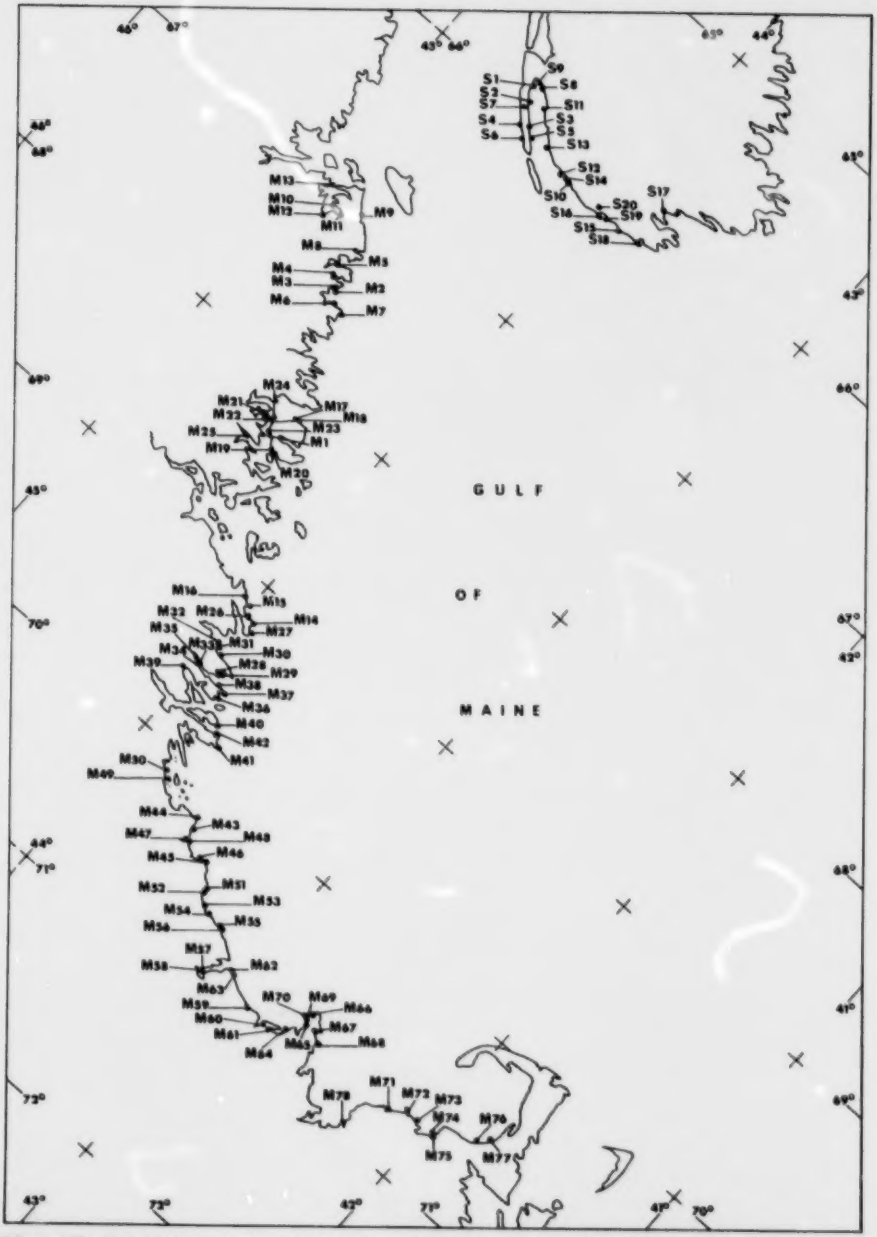
Map 1C Collection stations on the Atlantic coast of eastern Nova Scotia

Sta No.	Date	Locality	Lat N	Long W	Depth	Temp °C	Salinity ‰	Habitat
A25	July 20	Bourgeois Inlet, at forks	45°38′	60°57.5′	28 ft Ekman grab	—	—	Mud, sandy mud, eelgrass
A26	July 20	Bourgeois Inlet, inside mouth	45°37′	60°57′	20 ft Ekman grab	—	—	Stones, algae
A27	July 20	Bourgeois Inlet, W arm channel	45°38′	60°58.5′	12-20 ft Ekman grab	—	—	Soft black mud
A26	July 20	Petit-de-Grat, bridge	45°30.5′	60°59′	MW	—	—	Cold-water channel, mud flats
A29	July 20	Sampson Cove, Isle Madame	45°29.5′	60°55.5′	MW to HW	—	—	Surf-exposed breakwater and rock pools
A30	July 20	Pondville Beach, Bay of Rocks	45°32′	60°58.5′	LW to HW	14.1	29.7	Bedrock, stones, sand, fucoids, *Lithothamnion*
A31	July 21	Haddock Harbour	45°33′	61°07′	LW	14.2	29.8	Sandstone, *Fucus*, soft mud, eelgrass
A32	July 21	Port Royal Harbour, at bridge	45°32′	61°05′	LW	14.5	—	Tidal flats, mud, eelgrass, *Mytilus* beds, shells
A33	July 21	Inhabitants Harbour, at Port Richmond	45°35′	61°16′	MW to HW	—	—	Gravel and sand at stream mouth
A34	July 21	Inhabitants R., at Ferry Road	45°37′	61°14′	LW	15.0	5.1	Mud, eelgrass, *Mytilus* beds, sandstone blocks, wharf pilings
A35	July 22	Guysborough Harbour, at Boylston Park	44°27′	61°32′	LW	13.9	25.8	Muddy sand, eelgrass, stones

Sta No.	Date	Locality	Lat N	Long W	Depth	Temp °C	Salinity ‰	Habitat
A36	July 22	Guysborough Harbour, at Lesterdale bridge	44°27.5′	61°32.5′	LW	—	—	Bridge abutments
A37	July 22	Guysborough Harbour, at Havendale	45°27′	61°34.5′	LW to HW	—	—	Gravel, mud flats, eelgrass, *Spartina*, HW debris
A38	July 22	Guysborough R., at Guysborough Intervale	45°28′	61°36.5′	MW to HW	—	Low, brackish	Stones, coarse silt, filamentous algae
A39	July 22	Dorts Cove, mouth of Salmon R.	45°21′	61°28′	LW	—	—	Surf-exposed pebble and sand bar
A40	July 22	Queensport, mouth of Rock Island R.	45°20′	61°16′	LW to HW	—	—	Steep gravel and sand beach, HW rock pools, fucoids
A41	July 22	St. Francis Harbour, at mouth	45°26.5′	61°18′	LW	16.5	—	Firm mud, *Mytilus* beds, eelgrass
A42	July 22	Oyster Ponds, outer shore	45°27′	61°16′	LW	15.1	— (inner pond is fresh)	Stones, pebbles, coarse-sand patches
A43	July 23	Marshall Cove, Whitehaven Harbour	45°14′	61°11.5′	LW	12.0	30.4	Sandy mud and eelgrass flats
A44	July 23	Denning I., Whitehaven Harbour	45°13′	61°10.5′	LW to HW	11.5	—	Granite bedrock, *Ascophyllum* and *Fucus*, LW pools, HW debris
A45	July 23	Port Felix	45°15′	61°14′	MW to HW	—	—	Coarse-sand and granite-stone beach
A46	July 23	Glasgow Head	45°19′	60°58′	HW	13.1	—	Surf-exposed boulders, stones, coarse sand
A47	July 23	Glasgow Harbour, NE arm	45°19′	60°58′	LW	17.1	29.6	Mud, eelgrass, shells
A48	July 24	Charlos Cove, W of bar	45°14.5′	61°20′	LW	13.5	29.7	Sandy mud, granite boulders, fucoids, eelgrass
A49	July 24	Charlos Creek, at mouth	45°14.5′	61°21′	LW	—	—	*Mytilus* beds, stones
A50	July 24	Torbay Beach	45°12′	61°22.5′	LW to HW	12.5	—	Exposed sand beach, sandstone and granite boulders, tide pools
A51	July 24	Weber Cove, at causeway	45°11.5′	61°21′	LW	—	—	Sand, eelgrass, fucoids, rock, *Ascophyllum*
A52	July 24	New Harbour estuary	45°11′	61°27	LW to HW	17.5	3.3	Sand, shells, eelgrass
A53	July 25	Webb Cove, Golboro Harbour	45°10′	61°38.5′	LW to MW	12.9	28.7	Stones, eelgrass, mud, detritus, fucoids
					LW	15.1 (inner)	—	*Lithothamnion*, fucoids, Irish moss
A54	July 25	Coddles Harbour, inner bay	45°10′	61°32.5′	LW	c.15.0	—	Eelgrass, fine mud, boulders
A55	July 25	Seal Harbour head, near West Brook	45°09.5′	61°35′	LW	—	—	Mud flats, eelgrass, stones, detritus, fresh-water inflow

Sta No.	Date	Locality	Lat N	Long W	Depth	Temp °C	Salinity ‰	Habitat
A56	July 25	Indian Harbour, at lake outflow	45°06.5′	61°51.5′	LW to MW	21.5, over 16.5	Mixed	Coarse, unconsolidated sand and stones, surf zone
A57	July 26	Baraswa Cove, inside breakwater	45°05′	61°50′	LW	—	—	Mud and eelgrass flats
A58	July 26	Wine Harbour, at shore road	45°04.5′	61°51′	LW	15.2	—	Sandy mud, eelgrass, filamentous algae, shells
A59	July 26	Port Bickerton, E side	45°06′	61°44′	LW	14.8	30.4	Sand and eelgrass flats, stones, *Fucus*
A60	July 30	Shiers Pond	44°55′	62°18′	LW to HW	18.2	—	Mud, shells, peat, eelgrass, *Spartina*, bridge piers, HW debris
A61	July 30	East Quoddy Pond, at inlet bridge	44°54′	62°18.5′	LW	18.9	29.8	Stones, shells, kelp, eelgrass, mud
A62	July 31	Spanish Ship Bay, at Hooper Brook	45°01′	62°02′	LW to HW	—	—	Stones, mud, detritus, eelgrass, fucoids
A63	July 31	Pye Point, Liscomb Harbour	45°00.5′	62°01′	LW	13.9	28.1	Wave-protected sand-stone gravel, sandy mud, eelgrass, fucoids, boulders
A64	July 31	Marie Joseph Beach	44°58′	62°03′	MW to HW	12.5	—	Steep, surf-exposed, fine-gravel and coarse-sand beach
A65	July 31	Baker Cove, at Marie Joseph	44°58.5′	62°04.5′	MW	19.5	Brackish	Eelgrass, fucoids, detritus
A66	Aug. 1	Jewer Cove, near Mitchell Bay	44°56′	62°11′	LW to HW	18.0	24.7	Boulders, *Ascophyllum*, eelgrass, shells, mud, cold freshwater stream outflow
A67	Aug. 1	Smith Cove, at hwy bridge	44°58′	62°13′	LW	—	—	Mud and eelgrass flats
A68	Aug. 1	Moosehead, White Island Bay	44°56.5′	62°16′	LW	16.4, over 14.5	22.4	Sand, stones, eelgrass, at stream mouth
A69	Aug. 2	Sober Island, at Hurd Cove bridge	44°51′	62°28.5′	LW	15.9	20.4	Eelgrass, detritus, mud, *Chondrus*, fucoids
A70	Aug. 2	Malagash Cove, at bridge	44°51′	62°32.5′	LW to HW	18.5	25.0	Mud, eelgrass, shells, stones, boulders, *Chondrus*, detritus
A71	Aug. 2	Mushaboom Harbour, at head	44°52′	62°34′	LW	18.0	—	Eelgrass, detritus, at wharf
A72	Aug. 2	Spry Bay, head of Tomlee Bay	44°50′	62°35′	LW	18.2	—	Protected sand, rocks, eelgrass, fucoids
A73	Aug. 3	Psyche Cove, south end	44°48′	62°33.5′	LW to HW	14.8	28.2	Fine sand, pebbles, bedrock, filamentous algae, chord grass
A74	Aug. 3	Mason Cove, E side of Tangier Harbour	44°48′	62°42′	LW	c.20.0	—	Eelgrass, detritus, shells, *Chondrus*
A75	Aug. 3	Popes Harbour W, at head	44°48′	62°40′	LW	22+	—	Eelgrass, stone chips, mud

Sta No.	Date	Locality	Lat N	Long W	Depth	Temp °C	Salinity ‰	Habitat
A76	Aug. 3	Popes Harbour, near mouth of First Lake R.	44°49′	62°38′	LW	19.0 to 21.5	—	Eelgrass, detritus, mud, sand, at edge of channel
A77	Aug. 4	Ship Harbour, at Rocky Brook	44°48′	62°51.5′	LW	19.5	Brackish	*Mytilus* beds, stones, detritus
A78	Aug. 4	Lower Ship Harbour, above Whale Island	44°48′	62°50′	LW	16.5	—	Stones, *Ascophyllum*, eelgrass, detritus
A79	Aug. 4	Oyster Pond, head of Jeddore Harbour	44°47′	63°01′	LW	21.0	5.2	Eelgrass, gravel, mud, stones, fucoids



Map 1D Collection stations in northern New England and western Nova Scotia

Table 6. Northern New England and Western Nova Scotia (1963)
Key to station localities on Map 1D: S – western Nova Scotia; M – northern New England

Sta No.	Date	Locality	Lat N	Long W	Depth	Temp °C	Salinity ‰	Habitat
S1	July 9	St. Marys Bay, above Red Bluff	44°34′	65°54′	LW	17.0	31.5	Sandstone, muddy sand, fucoids, *Chondrus*
S2	July 8	Centreville, Trout Cove, Digby Neck	44°33′	66°02′	MW to HW	10.4	32.3	Boulders, bedrock, kelp, *Corallina*
S3	July 9	E Sandy Cove, St. Marys shore, Digby Neck	44°29′	66°05′	LW	15.6	31.7	Sandy mud, fine gravel, fucoids, *Zostera*
S4	July 9	Sandy Cove, Fundy shore, Digby Neck	44°30′	66°06′	LW, HW	10.0	—	Coarse sand, bedrock pools
S5	July 9	Little River Wharf, St. Marys Bay	44°27′	66°08′	HW	—	—	Pools, drift debris
S6	July 9	Whale Cove, Digby Neck	44°26′	66°11′	HW	—	—	Bedrock fissures and pools
S7	July 9	Midway Lake, Digby Neck	44°32′	66°03′	Shoreline	22.0	Fresh	Stones, gravel, *Nuphar*
S8	July 9	Barton old wharf, St. Marys Bay	44°32′	65°53′	LW to MW	16.8	31.7	Coarse sand, mud, *Zostera, Cladophora*
S9	July 10	Brighton Bay head, near old wharf	44°33′	65°52′	LW to MW	17.8	31.7	Mud, sandy mud, stones, fucoids
S10	July 10	Meteghan Centre	44°12′	66°09′	LW	14.5	32.4	Sand beach, stones, gravel, fucoids
S11	July 11	Gilbert Point, W of lighthouse	44°29′	65°58′	LW to HW	15.6	31.8	Pebbles, sandy mud
S12	July 11	Upper Saulnierville, at stream mouth	44°17′	66°08′	LW to HW	—	Brackish	Stones, algae in stream outflow
S13	July 12	Grosses Cocques, at old harbour entrance	44°22′	66°06′	LW	14.3	31.4	Fine-sand flats, *Zostera* clumps
S14	July 12	Meteghan R., salt marsh	44°13′	66°08′	HW	—	—	Salt-marsh pools, mud banks, drift
S15	July 13	Port Maitland, at wharf	43°59′	66°09′	LW	14.0	—	Sand beach, slate-pebble foreshore
S16	July 14	Cape St. Mary, at wharf	44°05′	67°13′	HW	—	—	Slate bedrock and igneous boulders, HW-drift debris
S17	July 14	Eel Pond, Hwy No. 3 culvert	43°50′	65°56′	LW	22.0	Brackish	Gravel, mud, stones, fucoids, *Zostera*
S18	July 14	Cape Fourchu, at Yarmouth Light	43°48′	66°09′	HW	—	—	Bedrock spray pools, HW drift
S19	July 13	Salmon R., South Beach	44°03′	66°10′	LW to MW	13.8	32.1	Sand, pebbles, algae
S20	July 13	Mavillette, at road bridge	44°06′	66°12′	HW	—	Brackish	Salt-marsh pools, debris
M1	July 16	Mount Desert Narrows, W of causeway, Maine	44°25′	68°22′	LW	21.6	30.4	Mud, boulders, eelgrass, fucoids
M2	July 2	Pond Cove beach, near Roque Bluffs	44°37′	67°30′	HW	—	—	Sand, pebbles
M3	July 2	Roque Bluffs, salt marsh above bridge	44°37′	67°29′	LW	17.5	Brackish	Mud, stones, gravel

Sta No.	Date	Locality	Lat N	Long W	Depth	Temp °C	Salinity ‰	Habitat
M4	July 2	Little Kennebec Bay, 2 miles W of Larabee	44°40′	67°26′	LW	21+	Brackish	Mud, gravel, H_2S
M5	July 2	Fort O'Brien Point, near Machiasport	44°41′	67°24′	LW to MW	—	Brackish	Stream mouth, mud, stones, fucoids
M6	July 3	Sandy River Beach	44°34′	67°34′	LW	12.0	32.0	Coarse igneous sand, boulders, fucoids
	July 4	Sandy River Beach	44°34′	67°34′	HW	—	—	Sand
M7	July 3	Henry Point, E end Sawyer Cove, near Jonesport	44°32′	67°34′	LW	—	—	Bedrock, fucoids, debris
M8	July 4	Little Machias Bay, mouth of Cutler Brook	44°40′	67°15′	LW	17.0	Brackish	Gravel, mud, boulders
M9	July 4	South Trescott (Baillie's Mistake)	44°46′	67°04′	LW	9.5	32.3	Muddy sand, boulders, *Ascophyllum*
M10	July 4	Straight Bay, Cow Neck, Cobscook Bay	44°52′	67°08′	LW	12.4	31.8	Reducing mud flats, *Ulva, Cladophora*
M11	July 5	Cobscook Bay, SW arm, 2 miles below Whiting	44°49′	67°10′	LW to HW	13.4	29.6	HW debris and bedrock, LW mud, *Zostera, Ascophyllum*
M12	July 5	Dennys estuary, at hwy bridge, NW Cobscook Bay	44°56′	67°14′	LW	17.4	c.5.0	Gravel, mud, fucoids, *Zostera*, debris
M13	July 5	Reversing Falls, Cobscook Bay	44°53′	67°08′	MW	10.5	—	Bedrock, fucoids
M14	July 21	Mosquito Head, near Martinsville	43°56′	69°13′	HW	—	—	Twin sand beaches
M15	July 21	Spruce Head, at causeway	44°01′	69°08′	HW	—	—	Drift debris on igneous bedrock, gentle slope
M16	July 21	South Thomaston, at town beach	44°03′	69°07′	HW	—	—	Fine igneous sand, stones
M17	July 17	Sand Beach, near Great Head, Mount Desert I.	44°20′	68°11′	HW	—	—	Steep surf-exposed fine-shell sand beach
M18	July 18	The Ledges, north of Otter Cliff Point	44°19′	68°11′	HW	—	—	Igneous bedrock spray pools
M19	July 17	Mill Pond, near Prettymarsh	44°21′	68°25′	LW to HW	22.6	31.3	Mud, fucoids, stones, *Zostera*, filamentous algae
M20	July 17	Prettymarsh Pond, Mount Desert I.	44°21′	68°24′	LW to HW	24.6	31.1	Mud, gravel, stones, *Zostera, Enteromorpha*
M21	July 18	Marlboro Beach, Raccoon Cove	44°28′	68°17′	LW			Soft black muck, pebbles, *Mytilus* beds and *Echiurus*
M22	July 18	Lamoine Beach	44°27′	68°17′	LW	16.6	31.4	Sand, muddy sand, pebbles, stones
M23	July 19	Off Mount Desert I. Biological Station, Salisbury Cove, near buoy N6	44°26′	68°18′	15-60 ft Dredge	—	—	Black reducing mud
M24	July 19	Near Googin's Ledge, off Lamoine	44°27′	68°18′	15-50 ft Dredge	—	—	Mud, stones, sand

Sta No.	Date	Locality	Lat N	Long W	Depth	Temp °C	Salinity ‰	Habitat
M25	July 19	Bayside, mouth of Union R.	44°28′	68°26′	LW to MW	24.4	26.2	Gravel, boulders, fucoids
M26	July 21	North Cove, Tenant's Harbour	43°58′	69°12′	LW to MW	13.6	31.7	Bedrock, silty mud, *Ulva*, *Chondrus*
M27	July 21	1 mile NE Port Clyde	43°56′	69°15′	LW to MW	12.0	—	Sand, boulders
M28	July 21	Pemaquid Beach	43°52′	69°32′	LW	17.1	31.8	Bedrock, pebbles, coarse sand, *Chondrus*
M29	July 21	Pemaquid Point	43°50′	69°31′	LW to HW	16+	—	Sandstone schist bedrock, heavy surf
M30	July 22	Round Pond, at wharf	43°56′	69°27′	LW to MW	16.2	—	Silty mud, bedrock, *Mytilus* beds
M31	July 22	Hockamock Point, S of Medomak, at wharf	43°58′	69°25′	LW	15.1	31.5	Mud, gravel, shells, *Zostera*, *Chondrus*
M32	July 22	Sylvester Pond, Greenland Cove	43°59′	69°25′	LW to MW	22.3	31.4	Fine mud, stones, filamentous algae
M33	July 23	Damariscotta R., at town bridge	44°02′	69°32′	LW to HW	22.0	Brackish	Boulders, mud, *Chondrus*
M34	July 23	Damariscotta Salt Pond, 1 mile above Newcastle	44°01′	69°32′	Supratidal	—	Brackish	Thick mud, *Ruppia*, *Zostera* debris, *Spartina*
M35	July 23	Mouth of Oyster Creek, at Damariscotta estuary	44°04′	69°31′	LW	—	Brackish	Shells, mud, *Ruppia*, *Ulva*, at bridge abutments
M36	July 23	Hendricks Point Beach, Boothbay Harbour	43°49′	69°41′	LW	17.3	31.5?	Coarse sand, bedrock, fucoids, *Chondrus*
M37	July 24	Ocean Point, E Boothbay	43°49′	69°35′	LW to HW	15.3	31.8	Surf-exposed sandstones, schists, intrusives
M38	July 24	Linekin Bay, at Paradise Point	43°52′	69°35′	LW to MW	18.2	—	Gravel, chips, mud
M39	July 24	Sheepscot R., at hwy bridge, above sill	44°03′	69°37′	LW	25.3	c.15.0	Muddy sand, stones, *Enteromorpha*, *Zostera*
M40	July 24	Reid State Park beach	43°47′	69°43′	LW to HW	14.8	31.8+	Sandstone bedrock, coarse sand, surf
M41	July 25	Dune Beach, Hermit I.	43°43′	69°51′	LW	16.0	30.9	Schistose bedrock, *Chondrus*, sand, fucoids
M42	July 25	Popham Beach, at Fort Popham	43°45′	69°47′	MW to HW	—	—	Coarse to fine sand, igneous rock pools
M43	July 26	Prouts Neck, Saco Bay at yacht club	43°32′	70°20′	LW and subtidal	19.5	31.4	Graded sands, stones, *Zostera*
M44	July 26	Cape Elizabeth	43°34′	70°12′	HW	16.2	—	Surf-exposed pools in vertically bedded schistose rocks
M45	July 27	Biddeford Pool, at South Beach	43°27′	70°24′	LW	16.8	32.2	Coarse sand, bedrock, fucoids, debris
M46	July 27	Biddeford Pool, at Gut entrance	43°28′	70°21′	LW to MW	19+	—	Graded sands, organic sands, stones, *Zostera*
M47	July 28	Scarborough estuary, at abandoned RR culvert	43°34′	70°22′	LW to HW	25+	Brackish	Coarse gravel, algae, bridge abutments

Sta No	Date	Locality	Lat N	Long W	Depth	Temp °C	Salinity ‰	Habitat
M48	July 28	Pine Point, at Fisherman's Dock	43°33′	70°21′	LW to MW	22+	—	Graded sands, muddy sand, mussel shells
M49	July 29	Bridge Point, Cousins I.	43°46′	70°08′	MW to HW	21.8	—	Coarse sand, boulders, fucoids
M50	July 29	Staples Point (Moore Point), at Keeshawa Bay	43°48′	70°06′	LW to MW	22.2 to 26.9	—	Mud, bedrock, shells, *Zostera*, fucoids
M51	July 31	Cove E of Walker's Point, Kennebunkport	43°21′	70°27′	LW to MW	14.8	—	Igneous and volcanic bedrock, *Chondrus*, fucoids
M52	July 31	Mousam estuary mouth	43°21′	70°31′	LW, HW	17.3 to 24+	—	LW graded sands, HW salt marsh
M53	Aug. 1	Wells Inlet, S branch	43°16′	70°34′	LW	24+	31+	Mud flats, cliffs, *Spartina*, fucoids
M54	Aug. 1	Ogunquit Salt Marsh	43°16′	70°35′	MW to HW	—	—	Clean sand, *Spartina*, fucoids
M55	Aug. 1	Cape Neddick Beach, at creek mouth	43°12′	70°36′	LW	18.8	Brackish	Graded sand, gravel, mud, salt grasses
M56	Aug. 1	Cape Neddick, at Nubble Light	43°10′	70°35′	HW and supratidal	16.1	—	Granite bedrock, spray pools, under drift
M57	Aug. 2	Piscataque estuary, at Hwys 4 and 16 junct., N.H.	43°07′	70°50′	MW to HW	—	Brackish	Mud flats, *Spartina*
M58	Aug. 2	Piscataque estuary, at mouth Bellamy R.	43°08′	70°52′	LW	22.8	Brackish	Mud, boulders, shell, *Zostera*, fucoids
M59	Aug. 3	Seabrook beach, at Beckman's Point	42°53′	70°49′	LW	17.1 to 19.5	—	Surf-exposed coarse sand
M60	Aug. 4	Plum I. Sound, N side of entrance, Mass.	42°42′	70°47′	LW	17.1	31.8	Coarse sand
M61	Aug. 4	Plum I. estuary, at entrance Parker R. refuge	42°48′	70°48′	MW	—	—	Coarse ripple sand, mud, *Spartina*
M62	Aug. 5	Little Harbour, mouth of Piscataque R., N.H.	43°04′	70°44′	LW	15.2	31.6	Muddy sand, boulders, fucoids, kelp
M63	Aug. 5	Odiornes Point, opposite Isles of Shoals	43°03′	70°43′	MW to HW	—	—	Hard bedrock, stones, pools, debris
M64	Aug. 5	Castle Neck estuary, E side of mouth, Mass.	42°40′	70°43′	LW	18.1	—	Fine white sand, boulders
M65	Aug. 5	Essequit salt marsh, inside Wingarsheak Beach	42°39′	70°41′	HW	—	—	Mud, *Spartina*, *Ascophyllum* var.
M66	Aug. 6	Rockport, town beach	42°40′	70°37′	LW to MW	15.4	31.7	Variable sand, boulders, bedrock, fucoids
M67	Aug. 6	Essequit Channel, inside Gloucester entrance	42°37′	70°40′	MW to HW	18.6	—	Mud banks, *Mytilus* beds, *Ascophyllum* var., *Spartina*
M68	Aug. 7	Magnolia Beach, Cape Ann	42°35′	70°43′	LW to MW	14.6	—	Fine sand, boulders, stones, bedrock, fucoids

Sta No	Date	Locality	Lat N	Long W	Depth	Temp °C	Salinity ‰	Habitat
M69	Aug. 7	Annisquam Pond, Cape Ann	42°39′	70°39′	MW to HW	18+	—	Mud flat, eelgrass debris
M70	Aug. 7	Folly Bay, Cape Ann	42°42′	70°37′	HW	—	—	Igneous bedrock pools
M71	Aug. 7	Marshfield salt pond, W of Brant Rock at hwy gates	42°05′	70°38′	LW	—	Brackish	Mud banks, *Spartina*, muddy gravel, fucoids
M72	Aug. 8	Brant Rock, trailer camp shore	42°05′	70°37′	LW	13.8	32.1	Bedrock, boulders, gravel, sand, *Chorda*
M73	Aug. 8	Duxbury Bay, at causeway to beach	42°03′	70°38′	LW	22+	—	Mud, coarse sand, eelgrass, stones
M74	Aug. 9	Warren Cove, at Beach Park	41°56′	70°37′	LW	15.0	32.1	Fine sand, organic and muddy sand
M75	Aug. 9	Eel Creek, upper estuary, below head of tide	41°56′	70°37′	MW to HW	25+	Brackish	Mud, gravel, *Spartina*, 10-15 c.f.s.
M76	Aug. 10	Cape Cod Bay, S side of canal mouth	41°47′	70°30′	LW to HW	15.6	32.0	Coarse sand, stones, *Chorda*, *Zostera*, fucoids, HW sand
M77	Aug. 11	East Sandwich Beach, at inlet mouth	41°45′	70°26′	LW	19.4 to 23+	—	Sand, pebbles, gravel riffle, debris
M78	Aug. 12	North Weymouth, S of Boston	42°15′	70°57′	LW	20.4	—	Sandy silt, stones, *Chondrus*, *Ulva*

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